APPENDIX B
Statistical Tables

Table B-1.
Binomial Distribution

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
1	0	0.9500	0.9000	0.8500	0.8000	0.7500	0.7000	0.6500	0.6000	0.5500	0.5000	0.4500	0.4000	0.3500	0.3000	0.2500	0.2000	0.1500	0.1000	0.05000
	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	0	0.9025	0.8100	0.7225	0.6400	0.5625	0.4900	0.4225	0.3600	0.3025	0.2500	0.2025	0.1600	0.1225	0.09000	0.06250	0.04000	0.02250	0.01000	0.002500
	1	0.9975	0.9900	0.9775	0.9600	0.9375	0.9100	0.8775	0.8400	0.7975	0.7500	0.6975	0.6400	0.5775	0.5100	0.4375	0.3600	0.2775	0.1900	0.09750
	2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3	0	0.8574	0.729	0.6141	0.512	0.4219	0.343	0.2746	0.216	0.1664	0.125	0.09113	0.064	0.04288	0.027	0.01563	8.000E-03	3.375E-03	1.000E-03	1.250E-04
	1	0.9928	0.972	0.9393	0.896	0.8438	0.784	0.7183	0.648	0.5748	0.5	0.4253	0.352	0.2818	0.216	0.1563	0.104	0.06075	0.028	7.250E-03
	2	0.9999	0.999	0.9966	0.992	0.9844	0.973	0.9571	0.936	0.9089	0.875	0.8336	0.784	0.7254	0.657	0.5781	0.488	0.3859	0.271	0.1426
	3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
4	0	0.8145	0.6561	0.522	0.4096	0.3164	0.2401	0.1785	0.1296	0.09151	0.0625	0.04101	0.0256	0.01501	8.100E-03	3.906E-03	1.600E-03	5.062E-04	1.000E-04	6.250E-06
	1	0.986	0.9477	0.8905	0.8192	0.7383	0.6517	0.563	0.4752	0.391	0.3125	0.2415	0.1792	0.1265	0.0837	0.05078	0.0272	0.01198	3.700E-03	4.812E-04
	2	0.9995	0.9963	0.988	0.9728	0.9492	0.9163	0.8735	0.8208	0.7585	0.6875	0.609	0.5248	0.437	0.3483	0.2617	0.1808	0.1095	0.0523	0.01402
	3	1.000	0.9999	0.9995	0.9984	0.9961	0.9919	0.985	0.9744	0.959	0.9375	0.9085	0.8704	0.8215	0.7599	0.6836	0.5904	0.478	0.3439	0.1855
	4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5	0	0.7738	0.5905	0.4437	0.3277	0.2373	0.1681	0.116	0.07776	0.05033	0.03125	0.01845	0.01024	5.252E-03	2.430E-03	9.766E-04	3.200E-04	7.594E-05	1.000E-05	3.125E-07
	1	0.9774	0.9185	0.8352	0.7373	0.6328	0.5282	0.4284	0.337	0.2562	0.1875	0.1312	0.08704	0.05402	0.03078	0.01562	6.720E-03	2.227E-03	4.600E-04	3.000E-05
	2	0.9988	0.9914	0.9734	0.9421	0.8965	0.8369	0.7648	0.6826	0.5931	0.5	0.4069	0.3174	0.2352	0.1631	0.1035	0.05792	0.02661	8.560E-03	1.158E-03
	3	1.000	0.9995	0.9978	0.9933	0.9844	0.9692	0.946	0.913	0.8688	0.8125	0.7438	0.663	0.5716	0.4718	0.3672	0.2627	0.1648	0.08146	0.02259
	4	1.000	1.000	0.9999	0.9997	0.999	0.9976	0.9947	0.9898	0.9815	0.9688	0.9497	0.9222	0.884	0.8319	0.7627	0.6723	0.5563	0.4095	0.2262
	5	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
6	0	0.7351	0.5314	0.3771	0.2621	0.178	0.1176	0.07542	0.04666	0.02768	0.01563	8.304E-03	4.096E-03	1.838E-03	7.290E-04	2.441E-04	6.400E-05	1.139E-05	1.000E-06	1.562E-08
	1	0.9672	0.8857	0.7765	0.6554	0.5339	0.4202	0.3191	0.2333	0.1636	0.1094	0.0692	0.04096	0.02232	0.01094	4.639E-03	1.600E-03	3.987E-04	5.500E-05	1.797E-06
	2	0.9978	0.9842	0.9527	0.9011	0.8306	0.7443	0.6471	0.5443	0.4415	0.3438	0.2553	0.1792	0.1174	0.07047	0.0376	0.01696	5.885E-03	1.270E-03	8.641E-05
	3	0.9999	0.9987	0.9941	0.983	0.9624	0.9295	0.8826	0.8208	0.7447	0.6563	0.5585	0.4557	0.3529	0.2557	0.1694	0.09888	0.04734	0.01585	2.230E-03
	4	1.000	0.9999	0.9996	0.9984	0.9954	0.9891	0.9777	0.959	0.9308	0.8906	0.8364	0.7667	0.6809	0.5798	0.4661	0.3446	0.2235	0.1143	0.03277
	5	1.000	1.000	1.000	0.9999	0.9998	0.9993	0.9982	0.9959	0.9917	0.9844	0.9723	0.9533	0.9246	0.8824	0.822	0.7379	0.6229	0.4686	0.2649
	6	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
7	0	0.6983	0.4783	0.3206	0.2097	0.1335	0.08235	0.04902	0.02799	0.01522	7.813E-03	3.737E-03	1.638E-03	6.434E-04	2.187E-04	6.104E-05	1.280E-05	1.709E-06	1.000E-07	7.812E-10
	1	0.9556	0.8503	0.7166	0.5767	0.4449	0.3294	0.2338	0.1586	0.1024	0.0625	0.03571	0.01884	9.008E-03	3.791E-03	1.343E-03	3.712E-04	6.948E-05	6.400E-06	1.047E-07
	2	0.9962	0.9743	0.9262	0.852	0.7564	0.6471	0.5323	0.4199	0.3164	0.2266	0.1529	0.09626	0.05561	0.0288	0.01288	4.672E-03	1.222E-03	1.765E-04	6.027E-06
	3	0.9998	0.9973	0.9879	0.9667	0.9294	0.874	0.8002	0.7102	0.6083	0.5	0.3917	0.2898	0.1998	0.126	0.07056	0.03334	0.0121	2.728E-03	1.936E-04
	4	1.000	0.9998	0.9988	0.9953	0.9871	0.9712	0.9444	0.9037	0.8471	0.7734	0.6836	0.5801	0.4677	0.3529	0.2436	0.148	0.07377	0.02569	3.757E-03
	5	1.000	1.000	0.9999	0.9996	0.9987	0.9962	0.991	0.9812	0.9643	0.9375	0.8976	0.8414	0.7662	0.6706	0.5551	0.4233	0.2834	0.1497	0.04438
	6	1.000	1.000	1.000	1.000	0.9999	0.9998	0.9994	0.9984	0.9963	0.9922	0.9848	0.972	0.951	0.9176	0.8665	0.7903	0.6794	0.5217	0.3017
	7	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
8	0	0.6634	0.4305	0.2725	0.1678	0.1001	0.05765	0.03186	0.0168	8.373E-03	3.906E-03	1.682E-03	6.554E-04	2.252E-04	6.561E-05	1.526E-05	2.560E-06	2.563E-07	1.000E-08	3.906E-11
	1	0.9428	0.8131	0.6572	0.5033	0.3671	0.2553	0.1691	0.1064	0.06318	0.03516	0.01812	8.520E-03	3.571E-03	1.290E-03	3.815E-04	8.448E-05	1.187E-05	7.300E-07	5.977E-09
	2	0.9942	0.9619	0.8948	0.7969	0.6785	0.5518	0.4278	0.3154	0.2201	0.1445	0.08846	0.04981	0.02532	0.01129	4.227E-03	1.231E-03	2.423E-04	2.341E-05	4.008E-07
	3	0.9996	0.995	0.9786	0.9437	0.8862	0.8059	0.7064	0.5941	0.477	0.3633	0.2604	0.1737	0.1061	0.05797	0.0273	0.01041	2.854E-03	4.316E-04	1.540E-05
	4	1.000	0.9996	0.9971	0.9896	0.9727	0.942	0.8939	0.8263	0.7396	0.6367	0.523	0.4059	0.2936	0.1941	0.1138	0.05628	0.02135	5.024E-03	3.718E-04
	5	1.000	1.000	0.9998	0.9988	0.9958	0.9887	0.9747	0.9502	0.9115	0.8555	0.7799	0.6846	0.5722	0.4482	0.3215	0.2031	0.1052	3.809E-02	5.788E-03
	6	1.000	1.000	1.000	0.9999	0.9996	0.9987	0.9964	0.9915	0.9819	0.9648	0.9368	0.8936	0.8309	0.7447	0.6329	0.4967	0.3428	0.1869	0.05724
	7	1.000	1.000	1.000	1.000	1.000	0.9999	0.9998	0.9993	0.9983	0.9961	0.9916	0.9832	0.9681	0.9424	0.8999	0.8322	0.7275	0.5695	0.3366
	8	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
9	0	0.6302	0.3874	0.2316	0.1342	0.07508	0.04035	0.02071	0.01008	4.605E-03	1.953E-03	7.567E-04	2.621E-04	7.882E-05	1.968E-05	3.815E-06	5.120E-07	3.844E-08	1.000E-09	1.953E-12
	1	0.9288	0.7748	0.5995	0.4362	0.3003	0.196	0.1211	0.07054	0.03852	0.01953	9.080E-03	3.801E-03	1.396E-03	4.330E-04	1.068E-04	1.894E-05	1.999E-06	8.200E-08	3.359E-10

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
	2	0.9916	0.947	0.8591	0.7382	0.6007	0.4628	0.3373	0.2318	0.1495	0.08984	0.04977	0.02503	0.01118	4.291E-03	1.343E-03	3.139E-04	4.644E-05	2.998E-06	2.572E-08
	3	0.9994	0.9917	0.9661	0.9144	0.8343	0.7297	0.6089	0.4826	0.3614	0.2539	0.1658	0.09935	0.05359	0.02529	9.995E-03	3.066E-03	6.340E-04	6.423E-05	1.151E-06
	4	1.000	0.9991	0.9944	0.9804	0.9511	0.9012	0.8283	0.7334	0.6214	0.5	0.3786	0.2666	0.1717	0.09881	0.04893	0.01958	5.629E-03	8.909E-04	3.322E-05
	5	1.000	0.9999	0.9994	0.9969	0.99	0.9747	0.9464	0.9006	0.8342	0.7461	0.6386	0.5174	0.3911	0.2703	0.1657	0.08564	0.03393	8.331E-03	6.426E-04
	6	1.000	1.000	1.000	0.9997	0.9987	0.9957	0.9888	0.975	0.9502	0.9102	0.8505	0.7682	0.6627	0.5372	0.3993	0.2618	0.1409	0.05297	8.361E-03
	7	1.000	1.000	1.000	1.000	0.9999	0.9996	0.9986	0.9962	0.9909	0.9805	0.9615	0.9295	0.8789	0.804	0.6997	0.5638	0.4005	0.2252	0.07121
	8	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9992	0.998	0.9954	0.9899	0.9793	0.9596	0.9249	0.8658	0.7684	0.6126	0.3698
	9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
10	0	0.5987	0.3487	0.1969	0.1074	0.05631	0.02825	0.01346	6.047E-03	2.533E-03	9.766E-04	3.405E-04	1.049E-04	2.759E-05	5.905E-06	9.537E-07	1.024E-07	5.767E-09	1.000E-10	9.766E-14
	1	0.9139	0.7361	0.5443	0.3758	0.244	0.1493	0.08595	0.04636	0.02326	0.01074	4.502E-03	1.678E-03	5.399E-04	1.437E-04	2.956E-05	4.198E-06	3.325E-07	9.100E-09	1.865E-11
	2	0.9885	0.9298	0.8202	0.6778	0.5256	0.3828	0.2616	0.1673	0.09956	0.05469	0.02739	0.01229	4.821E-03	1.590E-03	4.158E-04	7.793E-05	8.665E-06	3.736E-07	1.605E-09
	3	0.999	0.9872	0.95	0.8791	0.7759	0.6496	0.5138	0.3823	0.266	0.1719	0.102	0.05476	0.02602	0.01059	3.506E-03	8.644E-04	1.346E-04	9.122E-06	8.198E-08
	4	0.9999	0.9984	0.9901	0.9672	0.9219	0.8497	0.7515	0.6331	0.5044	0.377	0.2616	0.1662	0.09493	0.04735	0.01973	6.369E-03	1.383E-03	1.469E-04	2.755E-06
	5	1.000	0.9999	0.9986	0.9936	0.9803	0.9527	0.9051	0.8338	0.7384	0.623	0.4956	0.3669	0.2485	0.1503	0.07813	0.03279	9.874E-03	1.635E-03	6.369E-05
	6	1.000	1.000	0.9999	0.9991	0.9965	0.9894	0.974	0.9452	0.898	0.8281	0.734	0.6177	0.4862	0.3504	0.2241	0.1209	0.04997	0.0128	1.028E-03
	7	1.000	1.000	1.000	0.9999	0.9996	0.9984	0.9952	0.9877	0.9726	0.9453	0.9004	0.8327	0.7384	0.6172	0.4744	0.3222	0.1798	0.07019	0.0115
	8	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9983	0.9955	0.9893	0.9767	0.9536	0.914	0.8507	0.756	0.6242	0.4557	0.2639	0.08614
	9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.999	0.9975	0.994	0.9865	0.9718	0.9437	0.8926	0.8031	0.6513	0.4013
	10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
11	0	0.5688	0.3138	0.1673	0.0859	0.04224	0.01977	8.7510E-03	3.6280E-03	1.3930E-03	4.8830E-04	1.532E-04	4.194E-05	9.655E-06	1.771E-06	2.384E-07	2.048E-08	8.650E-10	1.000E-11	4.883E-15
	1	0.8981	0.6974	0.4922	0.3221	0.1971	0.113	0.06058	0.03023	0.01393	5.8590E-03	2.213E-03	7.340E-04	2.069E-04	4.724E-05	8.106E-06	9.216E-07	5.478E-08	1.000E-09	1.025E-12
	2	0.9848	0.9104	0.7788	0.6174	0.4552	0.3127	0.2001	0.1189	0.06522	3.2710E-02	0.0148	5.924E-03	2.038E-03	5.777E-04	1.261E-04	1.894E-05	1.582E-06	4.555E-08	9.797E-11
	3	0.9984	0.9815	0.9306	0.8389	0.7133	0.5696	0.4256	0.2963	0.1911	0.1133	0.06096	0.02928	0.01224	4.291E-03	1.188E-03	2.352E-04	2.755E-05	1.248E-06	5.624E-09
	4	0.9999	0.9972	0.9841	0.9496	0.8854	0.7897	0.6683	0.5328	0.3971	0.2744	0.1738	0.09935	0.05014	0.02162	7.561E-03	1.965E-03	3.219E-04	2.290E-05	2.156E-07
	5	1.000	0.9997	0.9973	0.9883	0.9657	0.9218	0.8513	0.7535	0.6331	0.5	0.3669	0.2465	0.1487	0.07822	0.03433	0.01165	2.657E-03	2.957E-04	5.801E-06
	6	1.000	1.000	0.9997	0.998	0.9924	0.9784	0.9499	0.9006	0.8262	0.7256	0.6029	0.4672	0.3317	0.2103	0.1146	0.05041	0.01589	2.751E-03	1.119E-04
	7	1.000	1.000	1.000	0.9998	0.9988	0.9957	0.9878	0.9707	0.939	0.8867	0.8089	0.7037	0.5744	0.4304	0.2867	0.1611	0.06944	0.01853	1.552E-03
	8	1.000	1.000	1.000	1.000	0.9999	0.9994	0.998	0.9941	0.9852	0.9673	0.9348	0.8811	0.7999	0.6873	0.5448	0.3826	0.2212	0.08956	0.01524

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
	9	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.9993	0.9978	0.9941	0.9861	0.9698	0.9394	0.887	0.8029	0.6779	0.5078	0.3026	0.1019
	10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.9995	0.9986	0.9964	0.9912	0.9802	0.9578	0.9141	0.8327	0.6862	0.4312
	11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12	0	0.5404	0.2824	0.1422	0.06872	0.03168	0.01384	5.688E-03	2.177E-03	7.662E-04	0.0002441	6.895E-05	1.678E-05	3.379E-06	5.314E-07	5.960E-08	4.096E-09	1.297E-10	1.000E-12	2.441E-16
	1	0.8816	0.659	0.4435	0.2749	0.1584	0.08503	0.04244	0.01959	8.289E-03	0.003174	1.080E-03	3.188E-04	7.869E-05	1.541E-05	2.205E-06	2.007E-07	8.952E-09	1.090E-10	5.591E-14
	2	0.9804	0.8891	0.7358	0.5583	0.3907	0.2528	0.1513	0.08344	0.04214	0.01929	7.878E-03	2.810E-03	8.479E-04	2.064E-04	3.761E-05	4.526E-06	2.839E-07	5.455E-09	5.873E-12
	3	0.9978	0.9744	0.9078	0.7946	0.6488	0.4925	0.3467	0.2253	0.1345	0.073	0.03557	0.01527	5.610E-03	1.692E-03	3.917E-04	6.220E-05	5.478E-06	1.658E-07	3.743E-10
	4	0.9998	0.9957	0.9761	0.9274	0.8424	0.7237	0.5833	0.4382	0.3044	0.1938	0.1117	0.05731	0.02551	9.489E-03	2.782E-03	5.812E-04	7.170E-05	3.414E-06	1.612E-08
	5	1.000	0.9995	0.9954	0.9806	0.9456	0.8822	0.7873	0.6652	0.5269	0.3872	0.2607	0.1582	0.08463	0.0386	0.01425	3.903E-03	6.721E-04	5.018E-05	4.949E-07
	6	1.000	0.9999	0.9993	0.9961	0.9857	0.9614	0.9154	0.8418	0.7393	0.6128	0.4731	0.3348	0.2127	0.1178	0.0544	0.01941	4.642E-03	5.412E-04	1.111E-05
	7	1.000	1.000	0.9999	0.9994	0.9972	0.9905	0.9745	0.9427	0.8883	0.8062	0.6956	0.5618	0.4167	0.2763	0.1576	0.07256	0.02392	4.329E-03	1.839E-04
	8	1.000	1.000	1.000	0.9999	0.9996	0.9983	0.9944	0.9847	0.9644	0.927	0.8655	0.7747	0.6533	0.5075	0.3512	0.2054	0.09221	0.02564	2.236E-03
	9	1.000	1.000	1.000	1.000	1.000	0.9998	0.9992	0.9972	0.9921	0.9807	0.9579	0.9166	0.8487	0.7472	0.6093	0.4417	0.2642	0.1109	0.01957
	10	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9989	0.9968	0.9917	0.9804	0.9576	0.915	0.8416	0.7251	0.5565	0.341	0.1184
	11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9998	0.9992	0.9978	0.9943	0.9862	0.9683	0.9313	0.8578	0.7176	0.4596
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
13	0	0.5133	0.2542	0.1209	0.05498	0.02376	9.689E-03	3.697E-03	1.306E-03	4.214E-04	1.221E-04	3.103E-05	6.711E-06	1.183E-06	1.594E-07	1.490E-08	8.192E-10	1.946E-11	1.000E-13	1.221E-17
	1	0.8646	0.6213	0.3983	0.2336	0.1267	0.06367	0.02958	0.01263	4.904E-03	1.709E-03	5.240E-04	1.376E-04	2.974E-05	4.996E-06	5.960E-07	4.342E-08	1.453E-09	1.180E-11	3.027E-15
	2	0.9755	0.8661	0.692	0.5017	0.3326	0.2025	0.1132	0.0579	0.02691	0.01123	4.139E-03	1.315E-03	3.479E-04	7.270E-05	1.106E-05	1.066E-06	5.020E-08	6.436E-10	3.468E-13
	3	0.9969	0.9658	0.882	0.7473	0.5843	0.4206	0.2783	0.1686	0.09292	0.04614	0.02034	7.793E-03	2.515E-03	6.520E-04	1.261E-04	1.606E-05	1.063E-06	2.149E-08	2.429E-11
	4	0.9997	0.9935	0.9658	0.9009	0.794	0.6543	0.5005	0.353	0.2279	0.1334	0.06985	0.03208	0.01257	4.031E-03	9.891E-04	1.660E-04	1.541E-05	4.906E-07	1.162E-09
	5	1.000	0.9991	0.9925	0.97	0.9198	0.8346	0.7159	0.5744	0.4268	0.2905	0.1788	0.09767	0.0462	0.01822	5.649E-03	1.246E-03	1.618E-04	8.090E-06	4.006E-08
	6	1.000	0.9999	0.9987	0.993	0.9757	0.9376	0.8705	0.7712	0.6437	0.5	0.3563	0.2288	0.1295	0.06238	0.02429	7.004E-03	1.268E-03	9.929E-05	1.026E-06
	7	1.000	1.000	0.9998	0.9988	0.9944	0.9818	0.9538	0.9023	0.8212	0.7095	0.5732	0.4256	0.2841	0.1654	0.08021	0.03004	7.534E-03	9.200E-04	1.975E-05
	8	1.000	1.000	1.000	0.9998	0.999	0.996	0.9874	0.9679	0.9302	0.8666	0.7721	0.647	0.4995	0.3457	0.206	0.09913	0.03416	6.460E-03	2.866E-04
	9	1.000	1.000	1.000	1.000	0.9999	0.9993	0.9975	0.9922	0.9797	0.9539	0.9071	0.8314	0.7217	0.5794	0.4157	0.2527	0.118	0.03416	3.103E-03
	10	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9987	0.9959	0.9888	0.9731	0.9421	0.8868	0.7975	0.6674	0.4983	0.308	0.1339	0.02451
	11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9983	0.9951	0.9874	0.9704	0.9363	0.8733	0.7664	0.6017	0.3787	0.1354

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9996	0.9987	0.9963	0.9903	0.9762	0.945	0.8791	0.7458	0.4867
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
14	0	0.4877	0.2288	0.1028	0.04398	0.01782	6.782E-03	2.403E-03	7.836E-04	2.318E-04	6.104E-05	1.396E-05	2.684E-06	4.140E-07	4.783E-08	3.725E-09	1.638E-10	2.919E-12	1.000E-14	6.104E-19
	1	0.847	0.5846	0.3567	0.1979	0.101	0.04748	0.02052	8.098E-03	2.887E-03	9.155E-04	2.529E-04	5.906E-05	1.118E-05	1.610E-06	1.602E-07	9.339E-09	2.345E-10	1.270E-12	1.630E-16
	2	0.9699	0.8416	0.6479	0.4481	0.2811	0.1608	0.08393	0.03979	0.01701	6.470E-03	2.151E-03	6.087E-04	1.411E-04	2.531E-05	3.211E-06	2.479E-07	8.765E-09	7.498E-11	2.021E-14
	3	0.9958	0.9559	0.8535	0.6982	0.5213	0.3552	0.2205	0.1243	0.06322	0.02869	0.01143	3.906E-03	1.106E-03	2.465E-04	3.982E-05	4.065E-06	2.021E-07	2.729E-09	1.544E-12
	4	0.9996	0.9908	0.9533	0.8702	0.7415	0.5842	0.4227	0.2793	0.1672	0.08978	0.04262	0.01751	6.035E-03	1.666E-03	3.419E-04	4.605E-05	3.215E-06	6.840E-08	8.117E-11
	5	1.000	0.9985	0.9885	0.9561	0.8883	0.7805	0.6405	0.4859	0.3373	0.212	0.1189	0.05832	0.02434	8.289E-03	2.154E-03	3.819E-04	3.736E-05	1.251E-06	3.107E-09
	6	1.000	0.9998	0.9978	0.9884	0.9617	0.9067	0.8164	0.6925	0.5461	0.3953	0.2586	0.1501	0.07534	0.03147	0.01031	2.397E-03	3.276E-04	1.721E-05	8.934E-08
	7	1.000	1.000	0.9997	0.9976	0.9897	0.9685	0.9247	0.8499	0.7414	0.6047	0.4539	0.3075	0.1836	0.09328	0.03827	0.01161	2.207E-03	1.814E-04	1.962E-06
	8	1.000	1.000	1.000	0.9996	0.9978	0.9917	0.9757	0.9417	0.8811	0.788	0.6627	0.5141	0.3595	0.2195	0.1117	0.04385	0.01153	1.474E-03	3.309E-05
	9	1.000	1.000	1.000	1.000	0.9997	0.9983	0.994	0.9825	0.9574	0.9102	0.8328	0.7207	0.5773	0.4158	0.2585	0.1298	0.04674	9.230E-03	4.274E-04
	10	1.000	1.000	1.000	1.000	1.000	0.9998	0.9989	0.9961	0.9886	0.9713	0.9368	0.8757	0.7795	0.6448	0.4787	0.3018	0.1465	0.04413	4.173E-03
	11	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9994	0.9978	0.9935	0.983	0.9602	0.9161	0.8392	0.7189	0.5519	0.3521	0.1584	0.03005
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9991	0.9971	0.9919	0.9795	0.9525	0.899	0.8021	0.6433	0.4154	0.153
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9998	0.9992	0.9976	0.9932	0.9822	0.956	0.8972	0.7712	0.5123
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
15	0	0.4633	0.2059	0.08735	0.03518	0.01336	4.748E-03	1.562E-03	4.702E-04	1.275E-04	3.052E-05	6.283E-06	1.074E-06	1.449E-07	1.435E-08	9.313E-10	3.277E-11	4.379E-13	1.000E-15	3.052E-20
	1	0.829	0.549	0.3186	0.1671	0.08018	0.03527	0.01418	5.172E-03	1.692E-03	4.883E-04	1.215E-04	2.523E-05	4.181E-06	5.166E-07	4.284E-08	1.999E-09	3.766E-11	1.360E-13	8.728E-18
	2	0.9638	0.8159	0.6042	0.398	0.2361	0.1268	0.06173	0.02711	0.01065	3.693E-03	1.107E-03	2.789E-04	5.665E-05	8.719E-06	9.229E-07	5.705E-08	1.514E-09	8.641E-12	1.165E-15
	3	0.9945	0.9444	0.8227	0.6482	0.4613	0.2969	0.1727	0.0905	0.04242	0.01758	6.327E-03	1.928E-03	4.789E-04	9.166E-05	1.236E-05	1.011E-06	3.777E-08	3.403E-10	9.641E-14
	4	0.9994	0.9873	0.9383	0.8358	0.6865	0.5155	0.3519	0.2173	0.1204	0.05923	0.02547	9.348E-03	2.831E-03	6.722E-04	1.153E-04	1.246E-05	6.541E-07	9.296E-09	5.525E-12
	5	0.9999	0.9978	0.9832	0.9389	0.8516	0.7216	0.5643	0.4032	0.2608	0.1509	0.07693	0.03383	0.01244	3.653E-03	7.949E-04	1.132E-04	8.338E-06	1.866E-07	2.324E-10
	6	1.000	0.9997	0.9964	0.9819	0.9434	0.8689	0.7548	0.6098	0.4522	0.3036	0.1818	0.09505	0.04219	0.01524	4.193E-03	7.850E-04	8.090E-05	2.846E-06	7.418E-09
	7	1.000	1.000	0.9994	0.9958	0.9827	0.95	0.8868	0.7869	0.6535	0.5	0.3465	0.2131	0.1132	0.05001	0.0173	4.240E-03	6.096E-04	3.362E-05	1.830E-07
	8	1.000	1.000	0.9999	0.9992	0.9958	0.9848	0.9578	0.905	0.8182	0.6964	0.5478	0.3902	0.2452	0.1311	0.05662	0.01806	3.606E-03	3.106E-04	3.518E-06
	9	1.000	1.000	1.000	0.9999	0.9992	0.9963	0.9876	0.9662	0.9231	0.8491	0.7392	0.5968	0.4357	0.2784	0.1484	0.06105	0.01681	2.250E-03	5.281E-05
	10	1.000	1.000	1.000	1.000	0.9999	0.9993	0.9972	0.9907	0.9745	0.9408	0.8796	0.7827	0.6481	0.4845	0.3135	0.1642	0.06171	0.01272	6.147E-04

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
	11	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9981	0.9937	0.9824	0.9576	0.9095	0.8273	0.7031	0.5387	0.3518	0.1773	0.05556	5.467E-03
	12	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9989	0.9963	0.9893	0.9729	0.9383	0.8732	0.7639	0.602	0.3958	0.1841	0.0362
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9983	0.9948	0.9858	0.9647	0.9198	0.8329	0.6814	0.451	0.171
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9984	0.9953	0.9866	0.9648	0.9126	0.7941	0.5367
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
16	0	0.4401	0.1853	0.07425	0.02815	0.01002	3.323E-03	1.015E-03	2.821E-04	7.011E-05	1.526E-05	2.827E-06	4.295E-07	5.071E-08	4.305E-09	2.328E-10	6.554E-12	6.568E-14	1.000E-16	1.526E-21
	1	0.8108	0.5147	0.2839	0.1407	0.06348	0.02611	9.763E-03	3.291E-03	9.880E-04	2.594E-04	5.812E-05	1.074E-05	1.558E-06	1.650E-07	1.141E-08	4.260E-10	6.021E-12	1.450E-14	4.654E-19
	2	0.9571	0.7892	0.5614	0.3518	0.1971	0.09936	0.04509	0.01834	6.620E-03	2.090E-03	5.650E-04	1.267E-04	2.254E-05	2.977E-06	2.629E-07	1.301E-08	2.591E-10	9.865E-13	6.657E-17
	3	0.993	0.9316	0.7899	0.5981	0.405	0.2459	0.1339	0.06515	0.02813	0.01064	3.456E-03	9.385E-04	2.044E-04	3.360E-05	3.783E-06	2.479E-07	6.952E-09	4.181E-11	5.928E-15
	4	0.9991	0.983	0.9209	0.7982	0.6302	0.4499	0.2892	0.1666	0.08531	0.03841	0.01494	4.896E-03	1.302E-03	2.658E-04	3.811E-05	3.301E-06	1.302E-07	1.236E-09	3.678E-13
	5	0.9999	0.9967	0.9765	0.9183	0.8103	0.6598	0.49	0.3288	0.1976	0.1051	0.04862	0.01914	6.196E-03	1.566E-03	2.852E-04	3.261E-05	1.807E-06	2.703E-08	1.687E-11
	6	1.000	0.9995	0.9944	0.9733	0.9204	0.8247	0.6881	0.5272	0.366	0.2272	0.1241	0.05832	0.02286	7.130E-03	1.644E-03	2.476E-04	1.922E-05	4.526E-07	5.917E-10
	7	1.000	0.9999	0.9989	0.993	0.9729	0.9256	0.8406	0.7161	0.5629	0.4018	0.2559	0.1423	0.06706	0.02567	7.470E-03	1.476E-03	1.602E-04	5.924E-06	1.620E-08
	8	1.000	1.000	0.9998	0.9985	0.9925	0.9743	0.9329	0.8577	0.7441	0.5982	0.4371	0.2839	0.1594	0.07435	0.02713	7.004E-03	1.059E-03	6.133E-05	3.497E-07
	9	1.000	1.000	1.000	0.9998	0.9984	0.9929	0.9771	0.9417	0.8759	0.7728	0.634	0.4728	0.3119	0.1753	0.07956	0.02666	5.586E-03	5.045E-04	5.983E-06
	10	1.000	1.000	1.000	1.000	0.9997	0.9984	0.9938	0.9809	0.9514	0.8949	0.8024	0.6712	0.51	0.3402	0.1897	0.08169	0.02354	3.297E-03	8.090E-05
	11	1.000	1.000	1.000	1.000	1.000	0.9997	0.9987	0.9951	0.9851	0.9616	0.9147	0.8334	0.7108	0.5501	0.3698	0.2018	0.07905	0.017	8.573E-04
	12	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.9991	0.9965	0.9894	0.9719	0.9349	0.8661	0.7541	0.595	0.4019	0.2101	0.06841	7.004E-03
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9994	0.9979	0.9934	0.9817	0.9549	0.9006	0.8029	0.6482	0.4386	0.2108	0.04294
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.999	0.9967	0.9902	0.9739	0.9365	0.8593	0.7161	0.4853	0.1892
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.999	0.9967	0.99	0.9719	0.9257	0.8147	0.5599
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
17	0	0.4181	0.1668	0.06311	0.02252	7.517E-03	2.326E-03	6.600E-04	1.693E-04	3.856E-05	7.629E-06	1.272E-06	1.718E-07	1.775E-08	1.291E-09	5.821E-11	1.311E-12	9.853E-15	1.000E-17	7.629E-23
	1	0.7922	0.4818	0.2525	0.1182	0.05011	0.01928	6.701E-03	2.088E-03	5.749E-04	1.373E-04	2.771E-05	4.553E-06	5.781E-07	5.252E-08	3.027E-09	9.044E-11	9.590E-13	1.540E-15	2.472E-20
	2	0.9497	0.7618	0.5198	0.3096	0.1637	0.07739	0.03273	0.01232	4.086E-03	1.175E-03	2.862E-04	5.712E-05	8.903E-06	1.009E-06	7.427E-08	2.943E-09	4.399E-11	1.117E-13	3.770E-18
	3	0.9912	0.9174	0.7556	0.5489	0.353	0.2019	0.1028	0.04642	0.01845	6.363E-03	1.866E-03	4.514E-04	8.621E-05	1.216E-05	1.143E-06	5.999E-08	1.263E-09	5.069E-12	3.596E-16
	4	0.9988	0.9779	0.9013	0.7582	0.5739	0.3887	0.2348	0.126	0.05958	0.02452	8.623E-03	2.521E-03	5.887E-04	1.033E-04	1.236E-05	8.586E-07	2.544E-08	1.612E-10	2.402E-14
	5	0.9999	0.9953	0.9681	0.8943	0.7653	0.5968	0.4197	0.2639	0.1471	0.07173	0.0301	0.01059	3.015E-03	6.560E-04	9.989E-05	9.164E-06	3.817E-07	3.815E-09	1.193E-12

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
	6	1.000	0.9992	0.9917	0.9623	0.8929	0.7752	0.6188	0.4478	0.2902	0.1662	0.08259	0.03481	0.01203	3.235E-03	6.250E-04	7.561E-05	4.419E-06	6.959E-08	4.561E-11
	7	1.000	0.9999	0.9983	0.9891	0.9598	0.8954	0.7872	0.6405	0.4743	0.3145	0.1834	0.0919	0.03833	0.01269	3.101E-03	4.932E-04	4.037E-05	9.998E-07	1.372E-09
	8	1.000	1.000	0.9997	0.9974	0.9876	0.9597	0.9006	0.8011	0.6626	0.5	0.3374	0.1989	0.09938	0.04028	0.01238	2.581E-03	2.950E-04	1.146E-05	3.287E-08
	9	1.000	1.000	1.000	0.9995	0.9969	0.9873	0.9617	0.9081	0.8166	0.6855	0.5257	0.3595	0.2128	0.1046	0.04024	0.01093	1.738E-03	1.056E-04	6.314E-07
	10	1.000	1.000	1.000	0.9999	0.9994	0.9968	0.988	0.9652	0.9174	0.8338	0.7098	0.5522	0.3812	0.2248	0.1071	0.03766	8.280E-03	7.838E-04	9.728E-06
	11	1.000	1.000	1.000	1.000	0.9999	0.9993	0.997	0.9894	0.9699	0.9283	0.8529	0.7361	0.5803	0.4032	0.2347	0.1057	0.03187	4.667E-03	1.197E-04
	12	1.000	1.000	1.000	1.000	1.000	0.9999	0.9994	0.9975	0.9914	0.9755	0.9404	0.874	0.7652	0.6113	0.4261	0.2418	0.09871	0.02214	1.165E-03
	13	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9981	0.9936	0.9816	0.9536	0.8972	0.7981	0.647	0.4511	0.2444	0.08264	8.801E-03
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9988	0.9959	0.9877	0.9673	0.9226	0.8363	0.6904	0.4802	0.2382	0.05025
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9994	0.9979	0.9933	0.9807	0.9499	0.8818	0.7475	0.5182	0.2078
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.9993	0.9977	0.9925	0.9775	0.9369	0.8332	0.5819
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
18	0	0.3972	0.1501	0.05365	0.01801	5.638E-03	1.628E-03	4.290E-04	1.016E-04	2.121E-05	3.815E-06	5.726E-07	6.872E-08	6.212E-09	3.874E-10	1.455E-11	2.621E-13	1.478E-15	1.000E-18	3.815E-24
	1	0.7735	0.4503	0.2241	0.09908	0.03946	0.01419	4.587E-03	1.320E-03	3.336E-04	7.248E-05	1.317E-05	1.924E-06	2.139E-07	1.666E-08	8.004E-10	1.914E-11	1.522E-13	1.630E-16	1.308E-21
	2	0.9419	0.7338	0.4797	0.2713	0.1353	0.05995	0.02362	8.226E-03	2.506E-03	6.561E-04	1.440E-04	2.558E-05	3.492E-06	3.394E-07	2.084E-08	6.609E-10	7.413E-12	1.256E-14	2.120E-19
	3	0.9891	0.9018	0.7202	0.501	0.3057	0.1646	0.07827	0.03278	0.01198	3.769E-03	9.971E-04	2.148E-04	3.596E-05	4.355E-06	3.414E-07	1.435E-08	2.269E-10	6.074E-13	2.156E-17
	4	0.9985	0.9718	0.8794	0.7164	0.5187	0.3327	0.1886	0.09417	0.04107	0.01544	4.907E-03	1.279E-03	2.621E-04	3.950E-05	3.948E-06	2.197E-07	4.890E-09	2.068E-11	1.543E-15
	5	0.9998	0.9936	0.9581	0.8671	0.7175	0.5344	0.355	0.2088	0.1077	0.04813	0.01829	5.750E-03	1.438E-03	2.691E-04	3.425E-05	2.520E-06	7.888E-08	5.266E-10	8.247E-14
	6	1.000	0.9988	0.9882	0.9487	0.861	0.7217	0.5491	0.3743	0.2258	0.1189	0.05372	0.02028	6.169E-03	1.430E-03	2.312E-04	2.245E-05	9.873E-07	1.039E-08	3.414E-12
	7	1.000	0.9998	0.9973	0.9837	0.9431	0.8593	0.7283	0.5634	0.3915	0.2403	0.128	0.05765	0.02123	6.073E-03	1.244E-03	1.591E-04	9.812E-06	1.626E-07	1.119E-10
	8	1.000	1.000	0.9995	0.9957	0.9807	0.9404	0.8609	0.7368	0.5778	0.4073	0.2527	0.1347	0.05969	0.02097	5.422E-03	9.109E-04	7.857E-05	2.046E-06	2.947E-09
	9	1.000	1.000	0.9999	0.9991	0.9946	0.979	0.9403	0.8653	0.7473	0.5927	0.4222	0.2632	0.1391	0.05959	0.01935	4.252E-03	5.115E-04	2.088E-05	6.280E-08
	10	1.000	1.000	1.000	0.9998	0.9988	0.9939	0.9788	0.9424	0.872	0.7597	0.6085	0.4366	0.2717	0.1407	0.05695	0.01628	2.719E-03	1.735E-04	1.086E-06
	11	1.000	1.000	1.000	1.000	0.9998	0.9986	0.9938	0.9797	0.9463	0.8811	0.7742	0.6257	0.4509	0.2783	0.139	0.05127	0.01182	1.172E-03	1.523E-05
	12	1.000	1.000	1.000	1.000	1.000	0.9997	0.9986	0.9942	0.9817	0.9519	0.8923	0.7912	0.645	0.4656	0.2825	0.1329	0.0419	6.415E-03	1.720E-04
	13	1.000	1.000	1.000	1.000	1.000	1.000	0.9997	0.9987	0.9951	0.9846	0.9589	0.9058	0.8114	0.6673	0.4813	0.2836	0.1206	0.02819	1.546E-03
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.999	0.9962	0.988	0.9672	0.9217	0.8354	0.6943	0.499	0.2798	0.0982	0.01087
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9993	0.9975	0.9918	0.9764	0.94	0.8647	0.7287	0.5203	0.2662	0.05813
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9987	0.9954	0.9858	0.9605	0.9009	0.7759	0.5497	0.2265

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9996	0.9984	0.9944	0.982	0.9464	0.8499	0.6028
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
19	0	0.3774	0.1351	0.0456	0.01441	4.228E-03	1.140E-03	2.788E-04	6.094E-05	1.167E-05	1.907E-06	2.577E-07	2.749E-08	2.174E-09	1.162E-10	3.638E-12	5.243E-14	2.217E-16	1.000E-19	1.907E-25
	1	0.7547	0.4203	0.1985	0.08287	0.03101	0.01042	3.132E-03	8.328E-04	1.930E-04	3.815E-05	6.241E-06	8.109E-07	7.889E-08	5.269E-09	2.110E-10	4.037E-12	2.409E-14	1.720E-17	6.905E-23
	2	0.9335	0.7054	0.4413	0.2369	0.1113	0.04622	0.01696	5.464E-03	1.528E-03	3.643E-04	7.206E-05	1.139E-05	1.361E-06	1.135E-07	5.810E-09	1.475E-10	1.241E-12	1.402E-15	1.184E-20
	3	0.9868	0.885	0.6841	0.4551	0.2631	0.1332	0.05914	0.02296	7.719E-03	2.213E-03	5.279E-04	1.013E-04	1.486E-05	1.544E-06	1.010E-07	3.399E-09	4.033E-11	7.204E-14	1.280E-18
	4	0.998	0.9648	0.8556	0.6733	0.4654	0.2822	0.15	0.06961	0.02798	9.605E-03	2.756E-03	6.407E-04	1.151E-04	1.490E-05	1.243E-06	5.542E-08	9.263E-10	2.615E-12	9.762E-17
	5	0.9998	0.9914	0.9463	0.8369	0.6678	0.4739	0.2968	0.1629	0.07771	0.03178	0.01093	3.068E-03	6.736E-04	1.084E-04	1.152E-05	6.797E-07	1.599E-08	7.128E-11	5.589E-15
	6	1.000	0.9983	0.9837	0.9324	0.8251	0.6655	0.4812	0.3081	0.1727	0.08353	0.03423	0.01156	3.094E-03	6.173E-04	8.348E-05	6.506E-06	2.151E-07	1.513E-09	2.491E-13
	7	1.000	0.9997	0.9959	0.9767	0.9225	0.818	0.6656	0.4878	0.3169	0.1796	0.08713	0.03523	0.01144	2.823E-03	4.844E-04	4.979E-05	2.311E-06	2.561E-08	8.840E-12
	8	1.000	1.000	0.9992	0.9933	0.9713	0.9161	0.8145	0.6675	0.494	0.3238	0.1841	0.08847	0.03469	0.01054	2.288E-03	3.095E-04	2.013E-05	3.510E-07	2.537E-10
	9	1.000	1.000	0.9999	0.9984	0.9911	0.9674	0.9125	0.8139	0.671	0.5	0.329	0.1861	0.08747	0.03255	8.903E-03	1.579E-03	1.435E-04	3.930E-06	5.939E-09
	10	1.000	1.000	1.000	0.9997	0.9977	0.9895	0.9653	0.9115	0.8159	0.6762	0.506	0.3325	0.1855	0.08392	0.02875	6.658E-03	8.427E-04	3.614E-05	1.140E-07
	11	1.000	1.000	1.000	1.000	0.9995	0.9972	0.9886	0.9648	0.9129	0.8204	0.6831	0.5122	0.3344	0.182	0.07746	0.02328	4.084E-03	2.733E-04	1.793E-06
	12	1.000	1.000	1.000	1.000	0.9999	0.9994	0.9969	0.9884	0.9658	0.9165	0.8273	0.6919	0.5188	0.3345	0.1749	0.0676	0.01633	1.696E-03	2.306E-05
	13	1.000	1.000	1.000	1.000	1.000	0.9999	0.9993	0.9969	0.9891	0.9682	0.9223	0.8371	0.7032	0.5261	0.3322	0.1631	0.0537	8.593E-03	2.407E-04
	14	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9994	0.9972	0.9904	0.972	0.9304	0.85	0.7178	0.5346	0.3267	0.1444	0.03519	2.013E-03
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9978	0.9923	0.977	0.9409	0.8668	0.7369	0.5449	0.3159	0.115	0.01324
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9996	0.9985	0.9945	0.983	0.9538	0.8887	0.7631	0.5587	0.2946	0.06655
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.9992	0.9969	0.9896	0.969	0.9171	0.8015	0.5797	0.2453
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9997	0.9989	0.9958	0.9856	0.9544	0.8649	0.6226
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
20	0	0.3585	0.1216	0.03876	0.01153	3.171E-03	7.979E-04	1.812E-04	3.656E-05	6.416E-06	9.537E-07	1.159E-07	1.100E-08	7.610E-10	3.487E-11	9.095E-13	1.049E-14	3.325E-17	1.000E-20	9.537E-27
	1	0.7358	0.3917	0.1756	0.06918	0.02431	7.637E-03	2.133E-03	5.240E-04	1.114E-04	2.003E-05	2.950E-06	3.408E-07	2.903E-08	1.662E-09	5.548E-11	8.493E-13	3.802E-15	1.810E-18	3.633E-24
	2	0.9245	0.6769	0.4049	0.2061	0.09126	0.03548	0.01212	3.611E-03	9.274E-04	2.012E-04	3.586E-05	5.041E-06	5.277E-07	3.773E-08	1.611E-09	3.273E-11	2.067E-13	1.557E-16	6.578E-22
	3	0.9841	0.867	0.6477	0.4114	0.2252	0.1071	0.04438	0.01596	4.933E-03	1.288E-03	2.772E-04	4.734E-05	6.084E-06	5.427E-07	2.960E-08	7.978E-10	7.105E-12	8.466E-15	7.523E-20
	4	0.9974	0.9568	0.8298	0.6296	0.4148	0.2375	0.1182	0.05095	0.01886	5.909E-03	1.531E-03	3.170E-04	4.994E-05	5.550E-06	3.865E-07	1.380E-08	1.732E-10	3.263E-13	6.097E-18
	5	0.9997	0.9887	0.9327	0.8042	0.6172	0.4164	0.2454	0.1256	0.05533	0.02069	6.434E-03	1.612E-03	3.106E-04	4.294E-05	3.813E-06	1.803E-07	3.186E-09	9.481E-12	3.722E-16

n	*k*	*p*=0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
	6	1.000	0.9976	0.9781	0.9133	0.7858	0.608	0.4166	0.25	0.1299	0.05766	0.02141	6.466E-03	1.521E-03	2.610E-04	2.951E-05	1.845E-06	4.586E-08	2.155E-10	1.776E-14
	7	1.000	0.9996	0.9941	0.9679	0.8982	0.7723	0.601	0.4159	0.252	0.1316	0.05803	0.02103	6.015E-03	1.279E-03	1.837E-04	1.516E-05	5.295E-07	3.923E-09	6.786E-13
	8	1.000	0.9999	0.9987	0.99	0.9591	0.8867	0.7624	0.5956	0.4143	0.2517	0.1308	0.05653	0.01958	5.138E-03	9.354E-04	1.017E-04	4.983E-06	5.815E-08	2.108E-11
	9	1.000	1.000	0.9998	0.9974	0.9861	0.952	0.8782	0.7553	0.5914	0.4119	0.2493	0.1275	0.05317	0.01714	3.942E-03	5.634E-04	3.863E-05	7.089E-07	5.380E-10
	10	1.000	1.000	1.000	0.9994	0.9961	0.9829	0.9468	0.8725	0.7507	0.5881	0.4086	0.2447	0.1218	0.04796	0.01386	2.5950E-03	2.484E-04	7.151E-06	1.134E-08
	11	1.000	1.000	1.000	0.9999	0.9991	0.9949	0.9804	0.9435	0.8692	0.7483	0.5857	0.4044	0.2376	0.1133	0.04093	9.982E-03	1.329E-03	5.986E-05	1.979E-07
	12	1.000	1.000	1.000	1.000	0.9998	0.9987	0.994	0.979	0.942	0.8684	0.748	0.5841	0.399	0.2277	0.1018	0.03214	5.921E-03	4.156E-04	2.857E-06
	13	1.000	1.000	1.000	1.000	1.000	0.9997	0.9985	0.9935	0.9786	0.9423	0.8701	0.75	0.5834	0.392	0.2142	0.08669	0.02194	2.386E-03	3.395E-05
	14	1.000	1.000	1.000	1.000	1.000	1.000	0.9997	0.9984	0.9936	0.9793	0.9447	0.8744	0.7546	0.5836	0.3828	0.1958	0.06731	0.01125	3.293E-04
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9997	0.9985	0.9941	0.9811	0.949	0.8818	0.7625	0.5852	0.3704	0.1702	0.04317	2.574E-03
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9997	0.9987	0.9951	0.984	0.9556	0.8929	0.7748	0.5886	0.3523	0.133	0.0159
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.9991	0.9964	0.9879	0.9645	0.9087	0.7939	0.5951	0.3231	0.07548
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9999	0.9995	0.9979	0.9924	0.9757	0.9308	0.8244	0.6083	0.2642
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.9998	0.9992	0.9968	0.9885	0.9612	0.8784	0.6415
	20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

K has the binomial distribution with parameters *n* and *p*. The entries are the values of $P(K \leq k)$ for *p* ranging from 0.05 to 0.95 for values of *n* ranging from 1 to 20.

For $n > 20$, the *q*th quantile of *K* (a binomial random variable) may be approximated using the formula: $K_q = np + Z_q [np(1\text{-}p)]^{1/2}$, where Z_q is the q^{th} quantile of the standard normal distribution.

Table B-2.
Percentiles of the Chi-Square Distribution

	p									
df	**0.005**	**0.010**	**0.025**	**0.050**	**0.1**	**0.900**	**0.950**	**0.975**	**0.990**	**0.995**
1	3.93E-05	0.000157	0.000982	0.003932	0.01579	2.706	3.841	5.024	6.635	7.879
2	0.01003	0.0201	0.05064	0.1026	0.2107	4.605	5.991	7.378	9.21	10.6
3	0.07172	0.1148	0.2158	0.3518	0.5844	6.251	7.815	9.348	11.34	12.84
4	0.207	0.2971	0.4844	0.7107	1.064	7.779	9.488	11.14	13.28	14.86
5	0.4117	0.5543	0.8312	1.145	1.61	9.236	11.07	12.83	15.09	16.75
6	0.6757	0.8721	1.237	1.635	2.204	10.64	12.59	14.45	16.81	18.55
7	0.9893	1.239	1.69	2.167	2.833	12.02	14.07	16.01	18.48	20.28
8	1.344	1.646	2.18	2.733	3.49	13.36	15.51	17.53	20.09	21.95
9	1.735	2.088	2.7	3.325	4.168	14.68	16.92	19.02	21.67	23.59
10	2.156	2.558	3.247	3.94	4.865	15.99	18.31	20.48	23.21	25.19
11	2.603	3.053	3.816	4.575	5.578	17.28	19.68	21.92	24.72	26.76
12	3.074	3.571	4.404	5.226	6.304	18.55	21.03	23.34	26.22	28.3
13	3.565	4.107	5.009	5.892	7.042	19.81	22.36	24.74	27.69	29.82
14	4.075	4.66	5.629	6.571	7.79	21.06	23.68	26.12	29.14	31.32
15	4.601	5.229	6.262	7.261	8.547	22.31	25	27.49	30.58	32.8
16	5.142	5.812	6.908	7.962	9.312	23.54	26.3	28.85	32	34.27
17	5.697	6.408	7.564	8.672	10.09	24.77	27.59	30.19	33.41	35.72
18	6.265	7.015	8.231	9.39	10.86	25.99	28.87	31.53	34.81	37.16
19	6.844	7.633	8.907	10.12	11.65	27.2	30.14	32.85	36.19	38.58
20	7.434	8.26	9.591	10.85	12.44	28.41	31.41	34.17	37.57	40
21	8.034	8.897	10.28	11.59	13.24	29.62	32.67	35.48	38.93	41.4
22	8.643	9.542	10.98	12.34	14.04	30.81	33.92	36.78	40.29	42.8
23	9.26	10.2	11.69	13.09	14.85	32.01	35.17	38.08	41.64	44.18
24	9.886	10.86	12.4	13.85	15.66	33.2	36.42	39.36	42.98	45.56
25	10.52	11.52	13.12	14.61	16.47	34.38	37.65	40.65	44.31	46.93
26	11.16	12.2	13.84	15.38	17.29	35.56	38.89	41.92	45.64	48.29
27	11.81	12.88	14.57	16.15	18.11	36.74	40.11	43.19	46.96	49.64
28	12.46	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28	50.99
29	13.12	14.26	16.05	17.71	19.77	39.09	42.56	45.72	49.59	52.34
30	13.79	14.95	16.79	18.49	20.6	40.26	43.77	46.98	50.89	53.67
40	20.71	22.16	24.43	26.51	29.05	51.81	55.76	59.34	63.69	66.77
50	27.99	29.71	32.36	34.76	37.69	63.17	67.5	71.42	76.15	79.49
60	35.53	37.48	40.48	43.19	46.46	74.4	79.08	83.3	88.38	91.95
70	43.28	45.44	48.76	51.74	55.33	85.53	90.53	95.02	100.4	104.2
80	51.17	53.54	57.15	60.39	64.28	96.58	101.9	106.6	112.3	116.3
90	59.2	61.75	65.65	69.13	73.29	107.6	113.1	118.1	124.1	128.3
100	67.33	70.06	74.22	77.93	82.36	118.5	124.3	129.6	135.8	140.2

NOTE: Table generated using SAS, a statistical software package.
Percentiles of the Chi-square distribution $\chi_{p,\upsilon}$ are listed for various degrees of freedom υ:
$p = P(\chi_\upsilon \leq \chi_{p,\upsilon})$.

Table B-3.
Values of the Parameter λ for Cohen's Estimates

γ \ h	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	.15	.20
.00	.010100	.020400	.030902	.041583	.052507	.063625	.074953	.08649	.09824	.11020	.17342	.24268
.05	.010551	.021294	.032225	.043350	.054670	.066159	.077909	.08983	.10197	.11431	.17925	.25033
.10	.010950	.022082	.033398	.044902	.056596	.068483	.080563	.09285	.10534	.11804	.18479	.25741
.15	.011310	.022798	.034466	.046318	.058356	.070586	.083009	.09563	.10845	.12148	.18985	.26405
.20	.011642	.023459	.035453	.047829	.059990	.072539	.085280	.09822	.11135	.12469	.19460	.27031
.25	.011952	.024076	.036377	.048858	.061522	.074372	.087413	.10065	.11408	.12772	.19910	.27626
.30	.012243	.024658	.037249	.050018	.062969	.076106	.089433	.10295	.11667	.13059	.20338	.28193
.35	.012520	.025211	.038077	.051120	.064345	.077736	.091355	.10515	.11914	.13333	.20747	.28737
.40	.012784	.025738	.038866	.052173	.065660	.079332	.093193	.10725	.12150	.13595	.21129	.29250
.45	.013036	.026243	.039624	.053182	.066921	.080845	.094958	.10926	.12377	.13847	.21517	.29765
.50	.013279	.026728	.040352	.054153	.068135	.082301	.096657	.11121	.12595	.14090	.21882	.30253
.55	.013513	.027196	.041054	.055089	.069306	.083708	.098298	.11208	.12806	.14325	.22225	.30725
.60	.013739	.027849	.041733	.055995	.070439	.085068	.099887	.11490	.13011	.14552	.22578	.31184
.65	.013958	.028087	.042391	.056874	.071538	.086388	.10143	.11666	.13209	.14773	.22910	.31630
.70	.014171	.028513	.043030	.057726	.072505	.087670	.10292	.11837	.13402	.14987	.23234	.32065
.75	.014378	.029927	.043652	.058556	.073643	.088917	.10438	.12004	.13590	.15196	.23550	.32489
.80	.014579	.029330	.044258	.059364	.074655	.090133	.10580	.12167	.13775	.15400	.23858	.32903
.85	.014773	.029723	.044848	.060153	.075642	.091319	.10719	.12225	.13952	.15599	.24158	.33307
.90	.014967	.030107	.045425	.060923	.075606	.092477	.10854	.12480	.14126	.15793	.24452	.33703
.95	.015154	.030483	.045989	.061676	.077549	.093611	.10987	.12632	.14297	.15983	.24740	.34091
1.00	.015338	.030850	.046540	.062413	.078471	.094720	.11116	.12780	.14465	.16170	.25022	.34471

γ \ h	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.80	.90
.00	.31862	.4021	.4941	.5961	.7096	.8388	.9808	1.145	1.336	1.561	2.176	3.283
.05	.32793	.4130	.5066	.6101	.7252	.8540	.9994	1.166	1.358	1.585	2.203	3.314
.10	.33662	.4233	.5184	.6234	.7400	.8703	1.017	1.185	1.379	1.608	2.229	3.345
.15	.34480	.4330	.5296	.6361	.7542	.8860	1.035	1.204	1.400	1.630	2.255	3.376
.20	.35255	.4422	.5403	.6483	.7673	.9012	1.051	1.222	1.419	1.651	2.280	3.405
.25	.35993	.4510	.5506	.6600	.7810	.9158	1.067	1.240	1.439	1.672	2.305	3.435
.30	.36700	.4595	.5604	.6713	.7937	.9300	1.083	1.257	1.457	1.693	2.329	3.464
.35	.37379	.4676	.5699	.6821	.8060	.9437	1.098	1.274	1.475	1.713	2.353	3.492
.40	.38033	.4735	.5791	.6927	.8179	.9570	1.113	1.290	1.494	1.732	2.376	3.520
.45	.38665	.4831	.5880	.7029	.8295	.9700	1.127	1.306	1.511	1.751	2.399	3.547
.50	.39276	.4904	.5967	.7129	.8408	.9826	1.141	1.321	1.528	1.770	2.421	3.575
.55	.39679	.4976	.6061	.7225	.8517	.9950	1.155	1.337	1.545	1.788	2.443	3.601
.60	.40447	.5045	.6133	.7320	.8625	1.007	1.169	1.351	1.561	1.806	2.465	3.628
.65	.41008	.5114	.6213	.7412	.8729	1.019	1.182	1.368	1.577	1.824	2.486	3.654
.70	.41555	.5180	.6291	.7502	.8832	1.030	1.195	1.380	1.593	1.841	2.507	3.679
.75	.42090	.5245	.6367	.7590	.8932	1.042	1.207	1.394	1.608	1.851	2.528	3.705
.80	.42612	.5308	.6441	.7676	.9031	1.053	1.220	1.408	1.624	1.875	2.548	3.730
.85	.43122	.5370	.6515	.7781	.9127	1.064	1.232	1.422	1.639	1.892	2.568	3.754
.90	.43622	.5430	.6586	.7844	.9222	1.074	1.244	1.435	1.653	1.908	2.588	3.779
.95	.44112	.5490	.6656	.7925	.9314	1.085	1.255	1.448	1.668	1.924	2.607	3.803
1.00	.44592	.5548	.6724	.8005	.9406	1.095	1.287	1.461	1.882	1.940	2.626	3.827

Source: EPA/600/R-96/084.

Table B-4.
Critical Values of *D* for the Discordance Test

n	Level of Significance, α	
	0.01	**0.05**
3	1.155	1.153
4	1.492	1.463
5	1.749	1.672
6	1.944	1.822
7	2.097	1.938
8	2.221	2.032
9	2.323	2.110
10	2.410	2.176
11	2.485	2.234
12	2.550	2.285
13	2.607	2.331
14	2.659	2.371
15	2.705	2.409
16	2.747	2.443
17	2.785	2.475
18	2.821	2.504
19	2.854	2.532
20	2.884	2.557
21	2.912	2.580
22	2.939	2.603
23	2.963	2.624
24	2.987	2.644
25	3.009	2.663
26	3.029	2.681
27	3.049	2.698
28	3.068	2.714
29	3.085	2.730
30	3.103	2.745

n	Level of Significance, α	
	0.01	**0.05**
31	3.119	2.759
32	3.135	2.773
33	3.150	2.786
34	3.164	2.799
35	3.178	2.811
36	3.191	2.823
37	3.204	2.835
38	3.216	2.846
39	3.228	2.857
40	3.240	2.866
41	3.251	2.877
42	3.261	2.887
43	3.271	2.896
44	3.282	2.905
45	3.292	2.914
46	3.302	2.923
47	3.310	2.931
48	3.319	2.940
49	3.329	2.948
50	3.336	2.956

Source: EPA/600/R-96/084.

Table B-5.
Critical Values for Dixon's Test (Extreme Value Test)

n	Level of Significance, α		
	0.10	**0.05**	**0.01**
3	0.886	0.941	0.988
4	0.679	0.765	0.889
5	0.557	0.642	0.780
6	0.482	0.560	0.698
7	0.434	0.507	0.637
8	0.479	0.554	0.683
9	0.441	0.512	0.635
10	0.409	0.477	0.597
11	0.517	0.576	0.679
12	0.490	0.546	0.642
13	0.467	0.521	0.615
14	0.492	0.546	0.641
15	0.472	0.525	0.616
16	0.454	0.507	0.595
17	0.438	0.490	0.577
18	0.424	0.475	0.561
19	0.412	0.462	0.547
20	0.401	0.450	0.535
21	0.391	0.440	0.524
22	0.382	0.430	0.514
23	0.374	0.421	0.505
24	0.367	0.413	0.497
25	0.360	0.406	0.489

Source: EPA/600/R-96/084.

Table B-6.
Critical Values for Duncan's Multiple Range Test

$\alpha = .05$

ν \ p	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97
2	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085
3	4.501	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516
4	3.927	4.013	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033
5	3.635	3.749	3.797	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814
6	3.461	3.587	3.649	3.680	3.694	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697
7	3.344	3.477	3.548	3.588	3.611	3.622	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626
8	3.261	3.399	3.475	3.521	3.549	3.566	3.575	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579
9	3.199	3.339	3.420	3.470	3.502	3.523	3.536	3.544	3.547	3.547	3.547	3.547	3.547	3.547	3.547	3.547	3.547	3.547
10	3.151	3.293	3.376	3.430	3.465	3.489	3.505	3.516	3.522	3.525	3.526	3.526	3.526	3.526	3.526	3.526	3.526	3.526
11	3.113	3.256	3.342	3.397	3.435	3.462	3.480	3.493	3.501	3.506	3.509	3.510	3.510	3.510	3.510	3.510	3.510	3.510
12	3.082	3.225	3.313	3.370	3.410	3.439	3.459	3.474	3.484	3.491	3.496	3.498	3.499	3.499	3.499	3.499	3.499	3.499
13	3.055	3.200	3.289	3.348	3.389	3.419	3.442	3.458	3.470	3.478	3.484	3.488	3.490	3.490	3.490	3.490	3.490	3.490
14	3.033	3.178	3.268	3.329	3.372	3.403	3.426	3.444	3.457	3.467	3.474	3.479	3.482	3.484	3.484	3.484	3.485	3.485
15	3.014	3.160	3.250	3.312	3.356	3.389	3.413	3.432	3.446	3.457	3.465	3.471	3.476	3.479	3.480	3.481	3.481	3.481
16	2.998	3.144	3.235	3.298	3.343	3.376	3.402	3.422	3.437	3.449	3.458	3.465	3.470	3.473	3.477	3.478	3.478	3.478
17	2.984	3.130	3.222	3.285	3.331	3.366	3.392	3.412	3.429	3.441	3.451	3.459	3.465	3.469	3.473	3.475	3.476	3.476
18	2.971	3.118	3.210	3.274	3.321	3.356	3.383	3.405	3.421	3.435	3.445	3.454	3.460	3.465	3.470	3.472	3.474	3.474
19	2.960	3.107	3.199	3.264	3.311	3.347	3.375	3.397	3.415	3.429	3.440	3.449	3.456	3.462	3.467	3.470	3.472	3.473
20	2.950	3.097	3.190	3.255	3.303	3.339	3.368	3.391	3.409	3.424	3.436	3.445	3.453	3.459	3.464	3.467	3.470	3.472
24	2.919	3.066	3.160	3.226	3.276	3.315	3.345	3.370	3.390	3.406	3.420	3.432	3.441	3.449	3.456	3.461	3.465	3.469
30	2.888	3.035	3.131	3.199	3.250	3.290	3.322	3.349	3.371	3.389	3.405	3.418	3.430	3.439	3.447	3.454	3.460	3.466
40	2.858	3.006	3.102	3.171	3.224	3.266	3.300	3.328	3.352	3.373	3.390	3.405	3.418	3.429	3.439	3.448	3.456	3.463
60	2.829	2.976	3.073	3.143	3.198	3.241	3.277	3.307	3.333	3.355	3.374	3.391	3.406	3.419	3.431	3.442	3.451	3.460
120	2.800	2.947	3.045	3.116	3.172	3.217	3.254	3.287	3.314	3.337	3.359	3.377	3.394	3.409	3.423	3.435	3.446	3.457
∞	2.772	2.918	3.017	3.089	3.146	3.193	3.232	3.265	3.294	3.320	3.343	3.363	3.382	3.399	3.414	3.428	3.442	3.454

$\alpha = .05$

ν \ p	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97
2	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085	6.085
3	4.501	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516	4.516
4	3.927	4.013	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033	4.033
5	3.635	3.749	3.797	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814	3.814
6	3.461	3.587	3.649	3.680	3.694	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697	3.697
7	3.344	3.477	3.548	3.588	3.611	3.622	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626	3.626
8	3.261	3.399	3.475	3.521	3.549	3.566	3.575	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579	3.579
9	3.199	3.339	3.420	3.470	3.502	3.523	3.536	3.544	3.547	3.547	3.547	3.547	3.547	3.547	3.547	3.547	3.547	3.547
10	3.151	3.293	3.376	3.430	3.465	3.489	3.505	3.516	3.522	3.525	3.526	3.526	3.526	3.526	3.526	3.526	3.526	3.526
11	3.113	3.256	3.342	3.397	3.435	3.462	3.480	3.493	3.501	3.506	3.509	3.510	3.510	3.510	3.510	3.510	3.510	3.510
12	3.082	3.225	3.313	3.370	3.410	3.439	3.459	3.474	3.484	3.491	3.496	3.498	3.499	3.499	3.499	3.499	3.499	3.499
13	3.055	3.200	3.289	3.348	3.389	3.419	3.442	3.458	3.470	3.478	3.484	3.488	3.490	3.490	3.490	3.490	3.490	3.490
14	3.033	3.178	3.268	3.329	3.372	3.403	3.426	3.444	3.457	3.467	3.474	3.479	3.482	3.484	3.484	3.484	3.485	3.485
15	3.014	3.160	3.250	3.312	3.356	3.389	3.413	3.432	3.446	3.457	3.465	3.471	3.476	3.479	3.480	3.481	3.481	3.481
16	2.998	3.144	3.235	3.298	3.343	3.376	3.402	3.422	3.437	3.449	3.458	3.465	3.470	3.473	3.477	3.478	3.478	3.478
17	2.984	3.130	3.222	3.285	3.331	3.366	3.392	3.412	3.429	3.441	3.451	3.459	3.465	3.469	3.473	3.475	3.476	3.476
18	2.971	3.118	3.210	3.274	3.321	3.356	3.383	3.405	3.421	3.435	3.445	3.454	3.460	3.465	3.470	3.472	3.474	3.474
19	2.960	3.107	3.199	3.264	3.311	3.347	3.375	3.397	3.415	3.429	3.440	3.449	3.456	3.462	3.467	3.470	3.472	3.473
20	2.950	3.097	3.190	3.255	3.303	3.339	3.368	3.391	3.409	3.424	3.436	3.445	3.453	3.459	3.464	3.467	3.470	3.472
24	2.919	3.066	3.160	3.226	3.276	3.315	3.345	3.370	3.390	3.406	3.420	3.432	3.441	3.449	3.456	3.461	3.465	3.469
30	2.888	3.035	3.131	3.199	3.250	3.290	3.322	3.349	3.371	3.389	3.405	3.418	3.430	3.439	3.447	3.454	3.460	3.466
40	2.858	3.006	3.102	3.171	3.224	3.266	3.300	3.328	3.352	3.373	3.390	3.405	3.418	3.429	3.439	3.448	3.456	3.463
60	2.829	2.976	3.073	3.143	3.198	3.241	3.277	3.307	3.333	3.355	3.374	3.391	3.406	3.419	3.431	3.442	3.451	3.460
120	2.800	2.947	3.045	3.116	3.172	3.217	3.254	3.287	3.314	3.337	3.359	3.377	3.394	3.409	3.423	3.435	3.446	3.457
∞	2.772	2.918	3.017	3.089	3.146	3.193	3.232	3.265	3.294	3.320	3.343	3.363	3.382	3.399	3.414	3.428	3.442	3.454

$\alpha = .01$

ν \ p	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.0
2	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.0
3	8.261	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.32
4	6.512	6.677	6.740	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.75
5	5.702	5.893	5.989	6.040	6.065	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.07
6	5.243	5.439	5.549	5.614	5.655	5.680	5.694	5.701	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.70
7	4.949	5.145	5.260	5.334	5.383	5.416	5.439	5.454	5.464	5.470	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.47
8	4.746	4.939	5.057	5.135	5.189	5.227	5.256	5.276	5.291	5.302	5.309	5.314	5.316	5.317	5.317	5.317	5.317	5.31
9	4.596	4.787	4.906	4.986	5.043	5.086	5.118	5.142	5.160	5.174	5.185	5.193	5.199	5.203	5.205	5.206	5.206	5.20
10	4.482	4.671	4.790	4.871	4.931	4.975	5.010	5.037	5.058	5.074	5.088	5.098	5.106	5.112	5.117	5.120	5.122	5.12
11	4.392	4.579	4.697	4.780	4.841	4.887	4.924	4.952	4.975	4.994	5.009	5.021	5.031	5.039	5.045	5.050	5.054	5.05
12	4.320	4.504	4.622	4.706	4.767	4.815	4.852	4.883	4.907	4.927	4.944	4.958	4.969	4.978	4.986	4.993	4.998	5.00
13	4.260	4.442	4.560	4.644	4.706	4.755	4.793	4.824	4.850	4.872	4.889	4.904	4.917	4.928	4.937	4.944	4.950	4.95
14	4.210	4.391	4.508	4.591	4.654	4.704	4.743	4.775	4.802	4.824	4.843	4.859	4.872	4.884	4.894	4.902	4.910	4.91
15	4.168	4.347	4.463	4.547	4.610	4.660	4.700	4.733	4.760	4.783	4.803	4.820	4.834	4.846	4.857	4.866	4.874	4.88
16	4.131	4.309	4.425	4.509	4.572	4.622	4.663	4.696	4.724	4.748	4.768	4.786	4.800	4.813	4.825	4.835	4.844	4.85
17	4.099	4.275	4.391	4.475	4.539	4.589	4.630	4.664	4.693	4.717	4.738	4.756	4.771	4.785	4.797	4.807	4.816	4.82
18	4.071	4.246	4.362	4.445	4.509	4.560	4.601	4.635	4.664	4.689	4.711	4.729	4.745	4.759	4.772	4.783	4.792	4.80
19	4.046	4.220	4.335	4.419	4.483	4.534	4.575	4.610	4.639	4.665	4.686	4.705	4.722	4.736	4.749	4.761	4.771	4.78
20	4.024	4.197	4.312	4.395	4.459	4.510	4.552	4.587	4.617	4.642	4.664	4.684	4.701	4.716	4.729	4.741	4.751	4.76
24	3.956	4.126	4.239	4.322	4.386	4.437	4.480	4.516	4.546	4.573	4.596	4.616	4.634	4.651	4.665	4.678	4.690	4.70
30	3.889	4.056	4.168	4.250	4.314	4.366	4.409	4.445	4.477	4.504	4.528	4.550	4.569	4.586	4.601	4.615	4.628	4.64
40	3.825	3.988	4.098	4.180	4.244	4.296	4.339	4.376	4.408	4.436	4.461	4.483	4.503	4.521	4.537	4.553	4.566	4.57
60	3.762	3.922	4.031	4.111	4.174	4.226	4.270	4.307	4.340	4.368	4.394	4.417	4.438	4.456	4.474	4.490	4.504	4.51
120	3.702	3.858	3.965	4.044	4.107	4.158	4.202	4.239	4.272	4.301	4.327	4.351	4.372	4.392	4.410	4.426	4.442	4.45
∞	3.643	3.796	3.900	3.978	4.040	4.091	4.135	4.172	4.205	4.235	4.261	4.285	4.307	4.327	4.345	4.363	4.379	4.39

α = .01

ν \ p	20	22	24	26	28	30	32	34	36	38	40	50	60	70	80	90	100
1	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03	90.03
2	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04
3	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321	8.321
4	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756	6.756
5	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074	6.074
6	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703	5.703
7	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472	5.472
8	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317	5.317
9	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.206	5.026	5.206	5.206
10	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124	5.124
11	5.059	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061	5.061
12	5.006	5.010	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011
13	4.960	4.966	4.970	4.972	4.972	4.972	4.972	4.972	4.972	4.972	4.972	4.972	4.972	4.972	4.972	4.972	4.972
14	4.921	4.929	4.935	4.938	4.940	4.940	4.940	4.940	4.940	4.940	4.940	4.940	4.940	4.940	4.940	4.940	4.940
15	4.887	4.897	4.904	4.909	4.912	4.914	4.914	4.914	4.914	4.914	4.914	4.914	4.914	4.914	4.914	4.914	4.914
16	4.858	4.869	4.877	4.883	4.887	4.890	4.892	4.892	4.892	4.892	4.892	4.892	4.892	4.892	4.892	4.892	4.892
17	4.832	4.844	4.853	4.860	4.865	4.869	4.872	4.873	4.874	4.874	4.874	4.874	4.874	4.874	4.874	4.874	4.874
18	4.808	4.821	4.832	4.839	4.846	4.850	4.854	4.856	4.857	4.858	4.858	4.858	4.858	4.858	4.858	4.858	4.858
19	4.788	4.802	4.812	4.821	4.828	4.833	4.838	4.841	4.843	4.844	4.845	4.845	4.845	4.845	4.845	4.845	4.845
20	4.769	4.786	4.795	4.805	4.813	4.818	4.823	4.827	4.830	4.832	4.833	4.833	4.833	4.833	4.833	4.833	4.833
24	4.710	4.727	4.741	4.752	4.762	4.770	4.777	4.783	4.788	4.791	4.794	4.802	4.802	4.802	4.802	4.802	4.802
30	4.650	4.669	4.685	4.699	4.711	4.721	4.730	4.738	4.744	4.750	4.755	4.772	4.777	4.777	4.777	4.777	4.777
40	4.591	4.611	4.630	4.645	4.659	4.671	4.682	4.692	4.700	4.708	4.715	4.740	4.754	4.761	4.764	4.764	4.764
60	4.530	4.553	4.573	4.591	4.607	4.620	4.633	4.645	4.655	4.665	4.673	4.707	4.730	4.745	4.755	4.761	4.665
120	4.469	4.494	4.516	4.535	4.552	4.568	4.583	4.596	4.609	4.619	4.630	4.673	4.703	4.727	4.745	4.759	4.770
∞	4.408	4.434	4.457	4.478	4.497	4.514	4.530	4.545	4.559	4.572	4.584	4.635	4.675	4.707	4.734	4.756	4.776

Source: Reproduced from H. L. Harter, "Critical Values for Duncan's Multiple Range Test." *Biometrics*, 16, 671–685 (1960). With permission from the Biometric Society.

Source: Mason et al. (1989).

Table B-7.
Percentiles of the F Distribution

α = .01

Numerator Degrees of Freedom, df_1

Denominator Degrees of Freedom, df_2 \ df_1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	60	120
1	4052	5000	5403	5625	5764	5859	5928	5981	6022	6056	6106	6157	6209	6235	6261	6313	6339
2	98.5	99	99.17	99.25	99.3	99.33	99.36	99.37	99.39	99.4	99.42	99.43	99.45	99.46	99.47	99.48	99.49
3	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35	27.23	27.05	26.87	26.69	26.6	26.5	26.32	26.22
4	21.2	18	16.69	15.98	15.52	15.21	14.98	14.8	14.66	14.55	14.37	14.2	14.02	13.93	13.84	13.65	13.56
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.888	9.722	9.553	9.466	9.379	9.202	9.112
6	13.75	10.92	9.78	9.148	8.746	8.466	8.26	8.102	7.976	7.874	7.718	7.559	7.396	7.313	7.229	7.057	6.969
7	12.25	9.547	8.451	7.847	7.46	7.191	6.993	6.84	6.719	6.62	6.469	6.314	6.155	6.074	5.992	5.824	5.737
8	11.26	8.649	7.591	7.006	6.632	6.371	6.178	6.029	5.911	5.814	5.667	5.515	5.359	5.279	5.198	5.032	4.946
9	10.56	8.022	6.992	6.422	6.057	5.802	5.613	5.467	5.351	5.257	5.111	4.962	4.808	4.729	4.649	4.483	4.398
10	10.04	7.559	6.552	5.994	5.636	5.386	5.2	5.057	4.942	4.849	4.706	4.558	4.405	4.327	4.247	4.082	3.996
12	9.33	6.927	5.953	5.412	5.064	4.821	4.64	4.499	4.388	4.296	4.155	4.01	3.858	3.78	3.701	3.535	3.449
15	8.683	6.359	5.417	4.893	4.556	4.318	4.142	4.004	3.895	3.805	3.666	3.522	3.372	3.294	3.214	3.047	2.959
20	8.096	5.849	4.938	4.431	4.103	3.871	3.699	3.564	3.457	3.368	3.231	3.088	2.938	2.859	2.778	2.608	2.517
24	7.823	5.614	4.718	4.218	3.895	3.667	3.496	3.363	3.256	3.168	3.032	2.889	2.738	2.659	2.577	2.403	2.31
30	7.562	5.39	4.51	4.018	3.699	3.473	3.304	3.173	3.067	2.979	2.843	2.7	2.549	2.469	2.386	2.208	2.111
60	7.077	4.977	4.126	3.649	3.339	3.119	2.953	2.823	2.718	2.632	2.496	2.352	2.198	2.115	2.028	1.836	1.726
120	6.851	4.787	3.949	3.48	3.174	2.956	2.792	2.663	2.559	2.472	2.336	2.192	2.035	1.95	1.86	1.656	1.533

α = .025

Numerator Degrees of Freedom, df_1

Denominator Degrees of Freedom, df_2 \ df_1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	60	120
1	647.8	799.5	864.2	899.6	921.8	937.1	948.2	956.7	963.3	968.6	976.7	984.9	993.1	997.2	1001	1010	1014
2	38.51	39	39.17	39.25	39.3	39.33	39.36	39.37	39.39	39.4	39.41	39.43	39.45	39.46	39.46	39.48	39.49
3	17.44	16.04	15.44	15.1	14.88	14.73	14.62	14.54	14.47	14.42	14.34	14.25	14.17	14.12	14.08	13.99	13.95
4	12.22	10.65	9.979	9.605	9.364	9.197	9.074	8.98	8.905	8.844	8.751	8.657	8.56	8.511	8.461	8.36	8.309
5	10.01	8.434	7.764	7.388	7.146	6.978	6.853	6.757	6.681	6.619	6.525	6.428	6.329	6.278	6.227	6.123	6.069
6	8.813	7.26	6.599	6.227	5.988	5.82	5.695	5.6	5.523	5.461	5.366	5.269	5.168	5.117	5.065	4.959	4.904
7	8.073	6.542	5.89	5.523	5.285	5.119	4.995	4.899	4.823	4.761	4.666	4.568	4.467	4.415	4.362	4.254	4.199
8	7.571	6.059	5.416	5.053	4.817	4.652	4.529	4.433	4.357	4.295	4.2	4.101	3.999	3.947	3.894	3.784	3.728
9	7.209	5.715	5.078	4.718	4.484	4.32	4.197	4.102	4.026	3.964	3.868	3.769	3.667	3.614	3.56	3.449	3.392
10	6.937	5.456	4.826	4.468	4.236	4.072	3.95	3.855	3.779	3.717	3.621	3.522	3.419	3.365	3.311	3.198	3.14
12	6.554	5.096	4.474	4.121	3.891	3.728	3.607	3.512	3.436	3.374	3.277	3.177	3.073	3.019	2.963	2.848	2.787
15	6.2	4.765	4.153	3.804	3.576	3.415	3.293	3.199	3.123	3.06	2.963	2.862	2.756	2.701	2.644	2.524	2.461
20	5.871	4.461	3.859	3.515	3.289	3.128	3.007	2.913	2.837	2.774	2.676	2.573	2.464	2.408	2.349	2.223	2.156
24	5.717	4.319	3.721	3.379	3.155	2.995	2.874	2.779	2.703	2.64	2.541	2.437	2.327	2.269	2.209	2.08	2.01
30	5.568	4.182	3.589	3.25	3.026	2.867	2.746	2.651	2.575	2.511	2.412	2.307	2.195	2.136	2.074	1.94	1.866
60	5.286	3.925	3.343	3.008	2.786	2.627	2.507	2.412	2.334	2.27	2.169	2.061	1.944	1.882	1.815	1.667	1.581
120	5.152	3.805	3.227	2.894	2.674	2.515	2.395	2.299	2.222	2.157	2.055	1.945	1.825	1.76	1.69	1.53	1.433

α = .05

Denominator Degrees of Freedom, df_2 \ Numerator Degrees of Freedom, df_1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	60	120
1	161.4	199.5	215.7	224.6	230.2	234	236.8	238.9	240.5	241.9	243.9	245.9	248	249.1	250.1	252.2	253.3
2	18.51	19	19.16	19.25	19.3	19.33	19.35	19.37	19.38	19.4	19.41	19.43	19.45	19.45	19.46	19.48	19.49
3	10.13	9.552	9.277	9.117	9.013	8.941	8.887	8.845	8.812	8.786	8.745	8.703	8.66	8.639	8.617	8.572	8.549
4	7.709	6.944	6.591	6.388	6.256	6.163	6.094	6.041	5.999	5.964	5.912	5.858	5.803	5.774	5.746	5.688	5.658
5	6.608	5.786	5.409	5.192	5.05	4.95	4.876	4.818	4.772	4.735	4.678	4.619	4.558	4.527	4.496	4.431	4.398
6	5.987	5.143	4.757	4.534	4.387	4.284	4.207	4.147	4.099	4.06	4	3.938	3.874	3.841	3.808	3.74	3.705
7	5.591	4.737	4.347	4.12	3.972	3.866	3.787	3.726	3.677	3.637	3.575	3.511	3.445	3.41	3.376	3.304	3.267
8	5.318	4.459	4.066	3.838	3.687	3.581	3.5	3.438	3.388	3.347	3.284	3.218	3.15	3.115	3.079	3.005	2.967
9	5.117	4.256	3.863	3.633	3.482	3.374	3.293	3.23	3.179	3.137	3.073	3.006	2.936	2.9	2.864	2.787	2.748
10	4.965	4.103	3.708	3.478	3.326	3.217	3.135	3.072	3.02	2.978	2.913	2.845	2.774	2.737	2.7	2.621	2.58
12	4.747	3.885	3.49	3.259	3.106	2.996	2.913	2.849	2.796	2.753	2.687	2.617	2.544	2.505	2.466	2.384	2.341
15	4.543	3.682	3.287	3.056	2.901	2.79	2.707	2.641	2.588	2.544	2.475	2.403	2.328	2.288	2.247	2.16	2.114
20	4.351	3.493	3.098	2.866	2.711	2.599	2.514	2.447	2.393	2.348	2.278	2.203	2.124	2.082	2.039	1.946	1.896
24	4.26	3.403	3.009	2.776	2.621	2.508	2.423	2.355	2.3	2.255	2.183	2.108	2.027	1.984	1.939	1.842	1.79
30	4.171	3.316	2.922	2.69	2.534	2.421	2.334	2.266	2.211	2.165	2.092	2.015	1.932	1.887	1.841	1.74	1.683
60	4.001	3.15	2.758	2.525	2.368	2.254	2.167	2.097	2.04	1.993	1.917	1.836	1.748	1.7	1.649	1.534	1.467
120	3.92	3.072	2.68	2.447	2.29	2.175	2.087	2.016	1.959	1.91	1.834	1.75	1.659	1.608	1.554	1.429	1.352

α = .10

Denominator Degrees of Freedom, df_2 \ Numerator Degrees of Freedom, df_1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	60	120
1	39.86	49.5	53.59	55.83	57.24	58.2	58.91	59.44	59.86	60.19	60.71	61.22	61.74	62	62.26	62.79	63.06
2	8.526	9	9.162	9.243	9.293	9.326	9.349	9.367	9.381	9.392	9.408	9.425	9.441	9.45	9.458	9.475	9.483
3	5.538	5.462	5.391	5.343	5.309	5.285	5.266	5.252	5.24	5.23	5.216	5.2	5.184	5.176	5.168	5.151	5.143
4	4.545	4.325	4.191	4.107	4.051	4.01	3.979	3.955	3.936	3.92	3.896	3.87	3.844	3.831	3.817	3.79	3.775
5	4.06	3.78	3.619	3.52	3.453	3.405	3.368	3.339	3.316	3.297	3.268	3.238	3.207	3.191	3.174	3.14	3.123
6	3.776	3.463	3.289	3.181	3.108	3.055	3.014	2.983	2.958	2.937	2.905	2.871	2.836	2.818	2.8	2.762	2.742
7	3.589	3.257	3.074	2.961	2.883	2.827	2.785	2.752	2.725	2.703	2.668	2.632	2.595	2.575	2.555	2.514	2.493
8	3.458	3.113	2.924	2.806	2.726	2.668	2.624	2.589	2.561	2.538	2.502	2.464	2.425	2.404	2.383	2.339	2.316
9	3.36	3.006	2.813	2.693	2.611	2.551	2.505	2.469	2.44	2.416	2.379	2.34	2.298	2.277	2.255	2.208	2.184
10	3.285	2.924	2.728	2.605	2.522	2.461	2.414	2.377	2.347	2.323	2.284	2.244	2.201	2.178	2.155	2.107	2.082
12	3.177	2.807	2.606	2.48	2.394	2.331	2.283	2.245	2.214	2.188	2.147	2.105	2.06	2.036	2.011	1.96	1.932
15	3.073	2.695	2.49	2.361	2.273	2.208	2.158	2.119	2.086	2.059	2.017	1.972	1.924	1.899	1.873	1.817	1.787
20	2.975	2.589	2.38	2.249	2.158	2.091	2.04	1.999	1.965	1.937	1.892	1.845	1.794	1.767	1.738	1.677	1.643
24	2.927	2.538	2.327	2.195	2.103	2.035	1.983	1.941	1.906	1.877	1.832	1.783	1.73	1.702	1.672	1.607	1.571
30	2.881	2.489	2.276	2.142	2.049	1.98	1.927	1.884	1.849	1.819	1.773	1.722	1.667	1.638	1.606	1.538	1.499
60	2.791	2.393	2.177	2.041	1.946	1.875	1.819	1.775	1.738	1.707	1.657	1.603	1.543	1.511	1.476	1.395	1.348
120	2.748	2.347	2.13	1.992	1.896	1.824	1.767	1.722	1.684	1.652	1.601	1.545	1.482	1.447	1.409	1.32	1.265

NOTE: Table generated using SAS, a statistical software package.

Table B-8.
H-statistic for Confidence Limit on a Lognormal Mean

Values of $H_{1-\alpha} = H_{0.90}$ for Computing a One-Sided Upper 90% Confidence Limit on a Lognormal Mean

	n									
s_y	3	5	7	10	12	15	21	31	51	101
0.10	1.686	1.438	1.381	1.349	1.338	1.328	1.317	1.308	1.301	1.295
0.20	1.885	1.522	1.442	1.396	1.380	1.365	1.348	1.335	1.324	1.314
0.30	2.156	1.627	1.517	1.453	1.432	1.411	1.388	1.370	1.354	1.339
0.40	2.521	1.755	1.607	1.523	1.494	1.467	1.437	1.412	1.390	1.371
0.50	2.990	1.907	1.712	1.604	1.567	1.532	1.494	1.462	1.434	1.409
0.60	3.542	2.084	1.834	1.696	1.650	1.606	1.558	1.519	1.485	1.454
0.70	4.136	2.284	1.970	1.800	1.743	1.690	1.631	1.583	1.541	1.504
0.80	4.742	2.503	2.119	1.914	1.845	1.781	1.710	1.654	1.604	1.560
0.90	5.349	2.736	2.280	2.036	1.955	1.880	1.797	1.731	1.672	1.621
1.00	5.955	2.980	2.450	2.167	2.073	1.985	1.889	1.812	1.745	1.686
1.25	7.466	3.617	2.904	2.518	2.391	2.271	2.141	2.036	1.946	1.866
1.50	8.973	4.276	3.383	2.896	2.733	2.581	2.415	2.282	2.166	2.066
1.75	10.48	4.944	3.877	3.289	3.092	2.907	2.705	2.543	2.402	2.279
2.00	11.98	5.619	4.380	3.693	3.461	3.244	3.005	2.814	2.648	2.503
2.50	14.99	6.979	5.401	4.518	4.220	3.938	3.629	3.380	3.163	2.974
3.00	18.00	8.346	6.434	5.359	4.994	4.650	4.270	3.964	3.697	3.463
3.50	21.00	9.717	7.473	6.208	5.778	5.370	4.921	4.559	4.242	3.965
4.00	24.00	11.09	8.516	7.062	6.566	6.097	5.580	5.161	4.796	4.474
4.50	27.01	12.47	9.562	7.919	7.360	6.829	6.243	5.769	5.354	4.989
5.00	30.01	13.84	10.61	8.779	8.155	7.563	6.909	6.379	5.916	5.508
6.00	36.02	16.60	12.71	10.50	9.751	9.037	8.248	7.607	7.048	6.555
7.00	42.02	19.35	14.81	12.23	11.35	10.52	9.592	8.842	8.186	7.607
8.00	48.03	22.11	16.91	13.96	12.96	12.00	10.94	10.08	9.329	8.665
9.00	54.03	24.87	19.02	15.70	14.56	13.48	12.29	11.32	10.48	9.725
10.00	60.04	27.63	21.12	17.43	16.17	14.97	13.64	12.56	11.62	10.79

Values of $H_\alpha = H_{0.10}$ for Computing a One-Sided Lower 10% Confidence Limit on a Lognormal Mean

	n									
s_y	3	5	7	10	12	15	21	31	51	101
0.10	-1.431	-1.320	-1.296	-1.285	-1.281	-1.279	-1.277	-1.277	-1.278	-1.279
0.20	-1.350	-1.281	-1.268	-1.266	-1.266	-1.266	-1.268	-1.272	-1.275	-1.280
0.30	-1.289	-1.252	-1.250	-1.254	-1.257	-1.260	-1.266	-1.272	-1.280	-1.287
0.40	-1.245	-1.233	-1.239	-1.249	-1.254	-1.261	-1.270	-1.279	-1.289	-1.301
0.50	-1.213	-1.221	-1.234	-1.250	-1.257	-1.266	-1.279	-1.291	-1.304	-1.319
0.60	-1.190	-1.215	-1.235	-1.256	-1.266	-1.277	-1.292	-1.307	-1.324	-1.342
0.70	-1.176	-1.215	-1.241	-1.266	-1.278	-1.292	-1.310	-1.329	-1.349	-1.370
0.80	-1.168	-1.219	-1.251	-1.280	-1.294	-1.311	-1.332	-1.354	-1.377	-1.403
0.90	-1.165	-1.227	-1.264	-1.298	-1.314	-1.333	-1.358	-1.383	-1.409	-1.439
1.00	-1.166	-1.239	-1.281	-1.320	-1.337	-1.358	-1.387	-1.414	-1.445	-1.478
1.25	-1.184	-1.280	-1.334	-1.384	-1.407	-1.434	-1.470	-1.507	-1.547	-1.589
1.50	-1.217	-1.334	-1.400	-1.462	-1.491	-1.523	-1.568	-1.613	-1.063	-1.716
1.75	-1.260	-1.398	-1.477	-1.551	-1.585	-1.624	-1.677	-1.732	-1.790	-1.855
2.00	-1.310	-1.470	-1.562	-1.647	-1.688	-1.733	-1.795	-1.859	-1.928	-2.003
2.50	-1.426	-1.634	-1.751	-1.862	-1.913	-1.971	-2.051	-2.133	-2.223	-2.321
3.00	-1.560	-1.817	-1.960	-2.095	-2.157	-2.229	-2.326	-2.427	-2.536	-2.657
3.50	-1.710	-2.014	-2.183	-2.341	-2.415	-2.499	-2.615	-2.733	-2.864	-3.007
4.00	-1.871	-2.221	-2.415	-2.596	-2.681	-2.778	-2.913	-3.050	-3.200	-3.366
4.50	-2.041	-2.435	-2.653	-2.858	-2.955	-3.064	-3.217	-3.372	-3.542	-3.731
5.00	-2.217	-2.654	-2.897	-3.126	-3.233	-3.356	-3.525	-3.698	-3.889	-4.100
6.00	-2.581	-3.104	-3.396	-3.671	-3.800	-3.949	-4.153	-4.363	-4.594	-4.849
7.00	-2.955	-3.564	-3.904	-4.226	-4.377	-4.549	-4.790	-5.037	-5.307	-5.607
8.00	-3.336	-4.030	-4.418	-4.787	-4.960	-5.159	-5.433	-5.715	-6.026	-6.370
9.00	-3.721	-4.500	-4.937	-5.352	-5.547	-5.771	-6.080	-6.399	-6.748	-7.136
10.00	-4.109	-4.973	-5.459	-5.920	-6.137	-6.386	-6.730	-7.085	-7.474	-7.906

Values of $H_{1-\alpha} = H_{0.95}$ for Computing a One-Sided Upper 95% Confidence Limit on a Lognormal Mean

	n									
s_y	3	5	7	10	12	15	21	31	51	101
0.10	2.750	2.035	1.886	1.802	1.775	1.749	1.722	1.701	1.684	1.670
0.20	3.295	2.198	1.992	1.881	1.843	1.809	1.771	1.742	1.718	1.697
0.30	4.109	2.402	2.125	1.977	1.927	1.882	1.833	1.793	1.761	1.733
0.40	5.220	2.651	2.282	2.089	2.026	1.968	1.905	1.856	1.813	1.777
0.50	6.495	2.947	2.465	2.220	2.141	2.068	1.989	1.928	1.876	1.830
0.60	7.807	3.287	2.673	2.368	2.271	2.181	2.085	2.010	1.946	1.891
0.70	9.120	3.662	2.904	2.532	2.414	2.306	2.191	2.102	2.025	1.960
0.80	10.43	4.062	3.155	2.710	2.570	2.443	2.307	2.202	2.112	2.035
0.90	11.74	4.478	3.420	2.902	2.738	2.589	2.432	2.310	2.206	2.117
1.00	13.05	4.905	3.698	3.103	2.915	2.744	2.564	2.423	2.306	2.205
1.25	16.33	6.001	4.426	3.639	3.389	3.163	2.923	2.737	2.580	2.447
1.50	19.60	7.120	5.184	4.207	3.896	3.612	3.311	3.077	2.881	2.713
1.75	22.87	8.250	5.960	4.795	4.422	4.081	3.719	3.437	3.200	2.997
2.00	26.14	9.387	6.747	5.396	4.962	4.564	4.141	3.812	3.533	3.295
2.50	32.69	11.67	8.339	6.621	6.067	5.557	5.013	4.588	4.228	3.920
3.00	39.23	13.97	9.945	7.864	7.191	6.570	5.907	5.388	4.947	4.569
3.50	45.77	16.27	11.56	9.118	8.326	7.596	6.815	6.201	5.681	5.233
4.00	52.31	18.58	13.18	10.38	9.469	8.630	7.731	7.024	6.424	5.908
4.50	58.85	20.88	14.80	11.64	10.62	9.669	8.652	7.854	7.174	6.590
5.00	65.39	23.19	16.43	12.91	11.77	10.71	9.579	8.688	7.929	7.277
6.00	78.47	27.81	19.68	15.45	14.08	12.81	11.44	10.36	9.449	8.661
7.00	91.55	32.43	22.94	18.00	16.39	14.90	13.31	12.05	10.98	10.05
8.00	104.6	37.06	26.20	20.55	18.71	17.01	15.18	13.74	12.51	11.45
9.00	117.7	41.68	29.46	23.10	21.03	19.11	17.05	15.43	14.05	12.85
10.00	130.8	46.31	32.73	25.66	23.35	21.22	18.93	17.13	15.59	14.26

Values of $H_\alpha = H_{0.05}$ for Computing a One-Sided Lower 5% Confidence Limit on a Lognormal Mean

	n									
s_y	3	5	7	10	12	15	21	31	51	101
0.10	-2.130	-1.806	-1.731	-1.690	-1.677	-1.666	-1.655	-1.648	-1.644	-1.642
0.20	-1.949	-1.729	-1.678	-1.653	-1.646	-1.640	-1.636	-1.636	-1.637	-1.641
0.30	-1.816	-1.669	-1.639	-1.627	-1.625	-1.625	-1.627	-1.632	-1.638	-1.648
0.40	-1.717	-1.625	-1.611	-1.611	-1.613	-1.617	-1.625	-1.635	-1.647	-1.662
0.50	-1.644	-1.594	-1.594	-1.603	-1.609	-1.618	-1.631	-1.646	-1.663	-1.683
0.60	-1.589	-1.573	-1.584	-1.602	-1.612	-1.625	-1.643	-1.662	-1.685	-1.711
0.70	-1.549	-1.560	-1.582	-1.608	-1.622	-1.638	-1.661	-1.686	-1.713	-1.744
0.80	-1.521	-1.555	-1.586	-1.620	-1.636	-1.656	-1.685	-1.714	-1.747	-1.783
0.90	-1.502	-1.556	-1.595	-1.637	-1.656	-1.680	-1.713	-1.747	-1.785	-1.826
1.00	-1.490	-1.562	-1.610	-1.658	-1.681	-1.707	-1.745	-1.784	-1.827	-1.874
1.25	-1.486	-1.596	-1.662	-1.727	-1.758	-1.793	-1.842	-1.893	-1.949	-2.012
1.50	-1.508	-1.650	-1.733	-1.814	-1.853	-1.896	-1.958	-2.020	-2.091	-2.169
1.75	-1.547	-1.719	-1.819	-1.916	-1.962	-2.015	-2.088	-2.164	-2.247	-2.341
2.00	-1.598	-1.799	-1.917	-2.029	-2.083	-2.144	-2.230	-2.318	-2.416	-2.526
2.50	-1.727	-1.986	-2.138	-2.283	-2.351	-2.430	-2.540	-2.654	-2.780	-2.921
3.00	-1.880	-2.199	-2.384	-2.560	-2.644	-2.740	-2.874	-3.014	-3.169	-3.342
3.50	-2.051	-2.429	-2.647	-2.855	-2.953	-3.067	-3.226	-3.391	-3.574	-3.780
4.00	-2.237	-2.672	-2.922	-3.161	-3.275	-3.406	-3.589	-3.779	-3.990	-4.228
4.50	-2.434	-2.924	-3.206	-3.476	-3.605	-3.753	-3.960	-4.176	-4.416	-4.685
5.00	-2.638	-3.183	-3.497	-3.798	-3.941	-4.107	-4.338	-4.579	-4.847	-5.148
6.00	-3.062	-3.715	-4.092	-4.455	-4.627	-4.827	-5.106	-5.397	-5.721	-6.086
7.00	-3.499	-4.260	-4.699	-5.123	-5.325	-5.559	-5.886	-6.227	-6.608	-7.036
8.00	-3.945	-4.812	-5.315	-5.800	-6.031	-6.300	-6.674	-7.066	-7.502	-7.992
9.00	-4.397	-5.371	-5.936	-6.482	-6.742	-7.045	-7.468	-7.909	-8.401	-8.953
10.00	-4.852	-5.933	-6.560	-7.168	-7.458	-7.794	-8.264	-8.755	-9.302	-9.918

Source: After Land, 1975.
This table is used in Section 13.2.

Source: Gilbert (1987).

Table B-9.
Quantiles of D'Agostino's Test for Normality

Quantiles of D'Agostino's Test for Normality (Values of Y Such That $100p\%$ of the Distribution of Y is Less Than Y_p)

n	$Y_{0.005}$	$Y_{0.01}$	$Y_{0.025}$	$Y_{0.05}$	$Y_{0.10}$	$Y_{0.90}$	$Y_{0.95}$	$Y_{0.975}$	$Y_{0.99}$	$Y_{0.995}$
50	-3.949	-3.442	-2.757	-2.220	-1.661	0.759	0.923	1.038	1.140	1.192
60	-3.846	-3.360	-2.699	-2.179	-1.634	0.807	0.986	1.115	1.236	1.301
70	-3.762	-3.293	-2.652	-2.146	-1.612	0.844	1.036	1.176	1.312	1.388
80	-3.693	-3.237	-2.613	-2.118	-1.594	0.874	1.076	1.226	1.374	1.459
90	-3.635	-3.100	-2.580	-2.095	-1.579	0.899	1.109	1.268	1.426	1.518
00	-3.584	-3.150	-2.552	-2.075	-1.566	0.920	1.137	1.303	1.470	1.569
50	-3.405	-3.009	-2.452	-2.004	-1.520	0.990	1.233	1.423	1.623	1.746
00	-3.302	-2.922	-2.391	-1.960	-1.491	1.032	1.290	1.496	1.715	1.853
50	-3.227	-2.861	-2.348	-1.926	-1.471	1.060	1.328	1.545	1.779	1.927
00	-3.172	-2.816	-2.316	-1.906	-1.456	1.080	1.357	1.528	1.826	1.983
50	-3.129	-2.781	-2.291	-1.888	-1.444	1.096	1.379	1.610	1.863	2.026
00	-3.094	-2.753	-2.270	-1.873	-1.434	1.108	1.396	1.633	1.893	2.061
50	-3.064	-2.729	-2.253	-1.861	-1.426	1.119	1.411	1.652	1.918	2.090
00	-3.040	-2.709	-2.239	-1.850	-1.419	1.127	1.423	1.668	1.938	2.114
50	-3.019	-2.691	-2.226	-1.841	-1.413	1.135	1.434	1.682	1.957	2.136
00	-3.000	-2.676	-2.215	-1.833	-1.408	1.141	1.443	1.694	1.972	2.154
50	-2.984	-2.663	-2.206	-1.826	-1.403	1.147	1.451	1.704	1.986	2.171
00	-2.969	-2.651	-2.197	-1.820	-1.399	1.152	1.458	1.714	1.999	2.185
50	-2.956	-2.640	-2.189	-1.814	-1.395	1.157	1.465	1.722	2.010	2.199
00	-2.944	-2.630	-2.182	-1.809	-1.392	1.161	1.471	1.730	2.020	2.211
850	-2.933	-2.621	-2.176	-1.804	-1.389	1.165	1.476	1.737	2.029	2.221
900	-2.923	-2.613	-2.170	-1.800	-1.386	1.168	1.481	1.743	2.037	2.231
950	-2.914	-2.605	-2.164	-1.796	-1.383	1.171	1.485	1.749	2.045	2.241
1000	-2.906	-2.599	-2.159	-1.792	-1.381	1.174	1.489	1.754	2.052	2.249

Source: From D'Agostino, 1971. Used by permission.
The null hypothesis of a normal distribution is rejected at the α significance level if the D'Agostino test statistic Y is less than $Y_{\alpha/2}$ or greater than $Y_{1-\alpha/2}$.

Source: Gilbert (1987).

Table B-10.
Probabilities for the Small-Sample Mann-Kendall Test for Trend

S	n				S	n		
	4	5	8	9		6	7	10
0	0.625	0.592	0.548	0.540	1	0.500	0.500	0.500
2	0.375	0.408	0.452	0.460	3	0.360	0.386	0.431
4	0.167	0.242	0.360	0.381	5	0.235	0.281	0.364
6	0.042	0.117	0.274	0.306	7	0.136	0.191	0.300
8		0.042	0.199	0.238	9	0.068	0.199	0.242
10		0.0083	0.138	0.179	11	0.028	0.068	0.190
12			0.089	0.130	13	0.0083	0.035	0.146
14			0.054	0.090	15	0.0014	0.015	0.108
16			0.031	0.060	17		0.0054	0.078
18			0.016	0.038	19		0.0014	0.054

S	***n***				**S**	***n***		
	4	**5**	**8**	**9**		**6**	**7**	**10**
20			0.0071	0.022	21		0.00020	0.036
22			0.0028	0.012	23			0.023
24			0.00087	0.0063	25			0.014
26			0.00019	0.0029	27			0.0083
28			0.000025	0.0012	29			0.0046
30				0.00043	31			0.0023
32				0.00012	33			0.0011
34				0.000025	35			0.00047
36				0.0000028	37			0.00018
					39			0.000058
					41			0.000015
					43			0.0000028
					45			0.00000028

Source: EPA/600/R-96/084.

Table B-11.
Confidence Levels for Nonparametric Prediction Limits

	NUMBER OF FUTURE SAMPLES							
N	k=1	k=2	k=3	k=4	k=5	k=6	k=7	k=8
1	50.0	33.3	25.0	20.0	16.7	14.3	12.5	11.1
2	66.7	50.0	40.0	33.3	28.6	25.0	22.2	20.0
3	75.0	60.0	50.0	42.9	37.5	33.3	30.0	27.3
4	80.0	66.7	57.1	50.0	44.4	40.0	36.4	33.3
5	83.3	71.4	62.5	55.6	50.0	45.5	41.7	38.5
6	85.7	75.0	66.7	60.0	54.5	50.0	46.2	42.9
7	87.5	77.8	70.0	63.6	58.3	53.8	50.0	46.7
8	88.9	80.0	72.7	66.7	61.5	57.1	53.3	50.0
9	90.0	81.8	75.0	69.2	64.3	60.0	56.3	52.9
10	90.9	83.3	76.9	71.4	66.7	62.5	58.8	55.6
11	91.7	84.6	78.6	73.3	68.8	64.7	61.1	57.9
12	92.3	85.7	80.0	75.0	70.6	66.7	63.2	60.0
13	92.9	86.7	81.3	76.5	72.2	68.4	65.0	61.9
14	93.3	87.5	82.4	77.8	73.7	70.0	66.7	63.6
15	93.8	88.2	83.3	78.9	75.0	71.4	68.2	65.2
16	94.1	88.9	84.2	80.0	76.2	72.7	69.6	66.7
17	94.4	89.5	85.0	81.0	77.3	73.9	70.8	68.0
18	94.7	90.0	85.7	81.8	78.3	75.0	72.0	69.2
19	95.0	90.5	86.4	82.6	79.2	76.0	73.1	70.4
20	95.2	90.9	87.0	83.3	80.0	76.9	74.1	71.4
21	95.5	91.3	87.5	84.0	80.8	77.8	75.0	72.4
22	95.7	91.7	88.0	84.6	81.5	78.6	75.9	73.3
23	95.8	92.0	88.5	85.2	82.1	79.3	76.7	74.2
24	96.0	92.3	88.9	85.7	82.8	80.0	77.4	75.0
25	96.2	92.6	89.3	86.2	83.3	80.6	78.1	75.8
26	96.3	92.9	89.7	86.7	83.9	81.3	78.8	76.5
27	96.4	93.1	90.0	87.1	84.4	81.8	79.4	77.1
28	96.6	93.3	90.3	87.5	84.8	82.4	80.0	77.8
29	96.7	93.5	90.6	87.9	85.3	82.9	80.6	78.4
30	96.8	93.8	90.9	88.2	85.7	83.3	81.1	78.9
31	96.9	93.9	91.2	88.6	86.1	83.8	81.6	79.5
32	97.0	94.1	91.4	88.9	86.5	84.2	82.1	80.0
33	97.1	94.3	91.7	89.2	86.8	84.6	82.5	80.5
34	97.1	94.4	91.9	89.5	87.2	85.0	82.9	81.0
35	97.2	94.6	92.1	89.7	87.5	85.4	83.3	81.4
36	97.3	94.7	92.3	90.0	87.8	85.7	83.7	81.8
37	97.4	94.9	92.5	90.2	88.1	86.0	84.1	82.2
38	97.4	95.0	92.7	90.5	88.4	86.4	84.4	82.6
39	97.5	95.1	92.9	90.7	88.6	86.7	84.8	83.0
40	97.6	95.2	93.0	90.9	88.9	87.0	85.1	83.3

	NUMBER OF FUTURE SAMPLES							
N	k=1	k=2	k=3	k=4	k=5	k=6	k=7	k=8
41	97.6	95.3	93.2	91.1	89.1	87.2	85.4	83.7
42	97.7	95.5	93.3	91.3	89.4	87.5	85.7	84.0
43	97.7	95.6	93.5	91.5	89.6	87.8	86.0	84.3
44	97.8	95.7	93.6	91.7	89.8	88.0	86.3	84.6
45	97.8	95.7	93.8	91.8	90.0	88.2	86.5	84.9
46	97.9	95.8	93.9	92.0	90.2	88.5	86.8	85.2
47	97.9	95.9	94.0	92.2	90.4	88.7	87.0	85.5
48	98.0	96.0	94.1	92.3	90.6	88.9	87.3	85.7
49	98.0	96.1	94.2	92.5	90.7	89.1	87.5	86.0
50	98.0	96.2	94.3	92.6	90.9	89.3	87.7	86.2
51	98.1	96.2	94.4	92.7	91.1	89.5	87.9	86.4
52	98.1	96.3	94.5	92.9	91.2	89.7	88.1	86.7
53	98.1	96.4	94.6	93.0	91.4	89.8	88.3	86.9
54	98.2	96.4	94.7	93.1	91.5	90.0	88.5	87.1
55	98.2	96.5	94.8	93.2	91.7	90.2	88.7	87.3
56	98.2	96.6	94.9	93.3	91.8	90.3	88.9	87.5
57	98.3	96.6	95.0	93.4	91.9	90.5	89.1	87.7
58	98.3	96.7	95.1	93.5	92.1	90.6	89.2	87.9
59	98.3	96.7	95.2	93.7	92.2	90.8	89.4	88.1
60	98.4	96.8	95.2	93.8	92.3	90.9	89.6	88.2
61	98.4	96.8	95.3	93.8	92.4	91.0	89.7	88.4
62	98.4	96.9	95.4	93.9	92.5	91.2	89.9	88.6
63	98.4	96.9	95.5	94.0	92.6	91.3	90.0	88.7
64	98.5	97.0	95.5	94.1	92.8	91.4	90.1	88.9
65	98.5	97.0	95.6	94.2	92.9	91.5	90.3	89.0
66	98.5	97.1	95.7	94.3	93.0	91.7	90.4	89.2
67	98.5	97.1	95.7	94.4	93.1	91.8	90.5	89.3
68	98.6	97.1	95.8	94.4	93.2	91.9	90.7	89.5
69	98.6	97.2	95.8	94.5	93.2	92.0	90.8	89.6
70	98.6	97.2	95.9	94.6	93.3	92.1	90.9	89.7
71	98.6	97.3	95.9	94.7	93.4	92.2	91.0	89.9
72	98.6	97.3	96.0	94.7	93.5	92.3	91.1	90.0
73	98.6	97.3	96.1	94.8	93.6	92.4	91.3	90.1
74	98.7	97.4	96.1	94.9	93.7	92.5	91.4	90.2
75	98.7	97.4	96.2	94.9	93.8	92.6	91.5	90.4
76	98.7	97.4	96.2	95.0	93.8	92.7	91.6	90.5
77	98.7	97.5	96.3	95.1	93.9	92.8	91.7	90.6
78	98.7	97.5	96.3	95.1	94.0	92.9	91.8	90.7
79	98.8	97.5	96.3	95.2	94.0	92.9	91.9	90.8
80	98.8	97.6	96.4	95.2	94.1	93.0	92.0	90.9

	NUMBER OF FUTURE SAMPLES							
N	k=1	k=2	k=3	k=4	k=5	k=6	k=7	k=8
81	98.8	97.6	96.4	95.3	94.2	93.1	92.0	91.0
82	98.8	97.6	96.5	95.3	94.3	93.2	92.1	91.1
83	98.8	97.6	96.5	95.4	94.3	93.3	92.2	91.2
84	98.8	97.7	96.6	95.5	94.4	93.3	92.3	91.3
85	98.8	97.7	96.6	95.5	94.4	93.4	92.4	91.4
86	98.9	97.7	96.6	95.6	94.5	93.5	92.5	91.5
87	98.9	97.8	96.7	95.6	94.6	93.5	92.6	91.6
88	98.9	97.8	96.7	95.7	94.6	93.6	92.6	91.7
89	98.9	97.8	96.7	95.7	94.7	93.7	92.7	91.8
90	98.9	97.8	96.8	95.7	94.7	93.8	92.8	91.8
91	98.9	97.8	96.8	95.8	94.8	93.8	92.9	91.9
92	98.9	97.9	96.8	95.8	94.8	93.9	92.9	92.0
93	98.9	97.9	96.9	95.9	94.9	93.9	93.0	92.1
94	98.9	97.9	96.9	95.9	94.9	94.0	93.1	92.2
95	99.0	97.9	96.9	96.0	95.0	94.1	93.1	92.2
96	99.0	98.0	97.0	96.0	95.0	94.1	93.2	92.3
97	99.0	98.0	97.0	96.0	95.1	94.2	93.3	92.4
98	99.0	98.0	97.0	96.1	95.1	94.2	93.3	92.5
99	99.0	98.0	97.1	96.1	95.2	94.3	93.4	92.5
100	99.0	98.0	97.1	96.2	95.2	94.3	93.5	92.6

Source: EPA/530-SW-89-026.

Table B-12.
Nonparametric Confidence Intervals on a Proportion

Nonparametric 95% and 99% Confidence Intervals on a Proportion

u	n = 1				n = 2				n = 3				n = 4				n = 5				n = 6				u
0	0	0	.95	.99	0	0	.78	.90	0	0	.63	.78	0	0	.53	.68	0	0	.50	.60	0	0	.41	.54	0
1	.01	.05	1	1	.01	.03	.97	.99	.00	.02	.86	.94	.00	.01	.75	.86	.00	.01	.66	.78	.00	.01	.59	.71	1
2					.10	.22	1	1	.06	.14	.98	1	.04	.10	.90	.96	.03	.08	.81	.89	.03	.06	.73	.83	2
3									.22	.37	1	1	.14	.25	.99	1	.11	.19	.92	.97	.08	.15	.85	.92	3

u	n = 7				n = 8				n = 9				n = 10				n = 11				n = 12				u
0	0	0	.38	.50	0	0	.36	.45	0	0	.32	.43	0	0	.29	.38	0	0	.26	.36	0	0	.24	.25	0
1	.00	.01	.55	.64	.00	.01	.50	.59	.00	.01	.44	.57	.00	.01	.44	.51	.00	.00	.40	.50	.00	.00	.37	.45	1
2	.02	.05	.66	.76	.02	.05	.64	.71	.02	.04	.56	.66	.02	.04	.56	.62	.01	.03	.50	.59	.01	.03	.46	.55	2
3	.07	.13	.77	.86	.06	.11	.71	.80	.05	.10	.68	.75	.05	.09	.62	.70	.04	.08	.60	.66	.04	.07	.54	.65	3
4	.14	.23	.87	.93	.12	.19	.81	.88	.11	.17	.75	.83	.09	.15	.70	.78	.08	.14	.67	.74	.08	.12	.63	.70	4
5	.24	.34	.95	.98	.20	.29	.89	.94	.17	.25	.83	.89	.15	.22	.78	.85	.13	.20	.74	.81	.12	.18	.71	.77	5
6	.36	.45	.99	1	.29	.36	.95	.98	.25	.32	.90	.95	.22	.29	.85	.91	.19	.26	.80	.87	.17	.24	.76	.83	6

u	n = 13				n = 14				n = 15				n = 16				n = 17				n = 18				u
0	0	0	.23	.32	0	0	.23	.30	0	0	.22	.28	0	0	.20	.26	0	0	.19	.26	0	0	.18	.25	0
1	.00	.00	.34	.43	.00	.00	.32	.42	.00	.00	.30	.39	.00	.00	.30	.36	.00	.00	.28	.35	.00	.00	.27	.34	1
2	.01	.03	.43	.52	.01	.03	.42	.50	.01	.02	.39	.46	.01	.02	.37	.45	.01	.02	.35	.43	.01	.02	.33	.41	2
3	.04	.07	.52	.59	.03	.06	.50	.58	.03	.06	.47	.54	.03	.05	.44	.52	.03	.05	.42	.50	.03	.05	.41	.47	3
4	.07	.11	.59	.68	.06	.10	.58	.64	.06	.10	.53	.61	.06	.09	.50	.58	.05	.08	.49	.57	.05	.08	.47	.53	4
5	.11	.17	.66	.73	.10	.15	.63	.70	.09	.14	.61	.67	.09	.13	.56	.64	.08	.12	.54	.62	.08	.12	.53	.59	5
6	.16	.22	.74	.79	.15	.21	.68	.75	.13	.19	.67	.72	.13	.18	.63	.70	.12	.17	.59	.66	.11	.16	.59	.66	6
7	.21	.26	.78	.84	.19	.24	.76	.81	.18	.22	.71	.77	.17	.20	.70	.74	.16	.19	.65	.73	.15	.18	.63	.69	7
8	.27	.34	.83	.89	.25	.32	.79	.85	.23	.29	.78	.82	.21	.27	.73	.79	.20	.25	.72	.76	.18	.24	.67	.75	8
9	.32	.41	.89	.93	.30	.37	.85	.90	.28	.33	.81	.87	.26	.30	.80	.83	.24	.28	.75	.80	.23	.27	.73	.77	9

u	n = 19				n = 20				n = 21				n = 22				n = 23				n = 24				u
0	0	0	.17	.24	0	0	.16	.22	0	0	.15	.21	0	0	.15	.20	0	0	.14	.19	0	0	.13	.19	0
1	.00	.00	.25	.32	.00	.00	.24	.31	.00	.00	.23	.29	.00	.00	.22	.28	.00	.00	.21	.27	.00	.00	.20	.26	1
2	.01	.02	.32	.39	.01	.02	.32	.37	.01	.02	.30	.37	.01	.02	.29	.35	.01	.02	.27	.33	.01	.02	.26	.32	2
3	.02	.04	.39	.46	.02	.04	.37	.44	.02	.04	.35	.42	.02	.04	.34	.40	.02	.04	.32	.39	.02	.03	.31	.39	3
4	.05	.08	.45	.52	.04	.07	.42	.50	.04	.07	.40	.47	.04	.06	.39	.45	.04	.06	.39	.45	.04	.06	.37	.43	4
5	.07	.11	.50	.56	.07	.10	.47	.56	.07	.10	.46	.53	.06	.09	.45	.50	.06	.09	.43	.50	.06	.09	.41	.48	5
6	.10	.15	.55	.61	.10	.14	.53	.60	.09	.13	.51	.58	.09	.13	.50	.55	.08	.12	.48	.55	.08	.11	.46	.52	6
7	.14	.17	.61	.68	.13	.16	.58	.64	.12	.15	.55	.63	.12	.15	.55	.60	.11	.14	.52	.58	.11	.13	.50	.57	7
8	.17	.22	.66	.71	.16	.21	.63	.69	.15	.20	.60	.66	.15	.19	.58	.65	.14	.18	.57	.62	.13	.17	.54	.61	8
9	.21	.25	.69	.76	.20	.24	.68	.73	.19	.23	.65	.71	.18	.22	.62	.68	.17	.21	.61	.67	.16	.20	.59	.64	9
10	.24	.31	.75	.79	.22	.29	.71	.78	.21	.28	.70	.74	.20	.26	.66	.72	.19	.25	.64	.70	.19	.23	.63	.68	10
11	.29	.34	.78	.83	.27	.32	.76	.80	.26	.30	.72	.79	.24	.29	.71	.76	.23	.27	.68	.73	.22	.26	.66	.72	11
12	.32	.39	.83	.86	.31	.37	.79	.84	.29	.35	.77	.81	.28	.34	.74	.80	.27	.32	.73	.77	.26	.31	.69	.74	12

u	n = 25				n = 26				n = 27				n = 28				n = 29				n = 30				u
0	0	0	.13	.18	0	0	.12	.17	0	0	.12	.17	0	0	.12	.16	0	0	.11	.16	0	0	.11	.16	0
1	.00	.00	.19	.26	.00	.00	.19	.25	.00	.00	.18	.24	.00	.00	.17	.23	.00	.00	.17	.22	.00	.00	.16	.22	1
2	.01	.01	.25	.31	.01	.01	.24	.30	.01	.01	.23	.30	.01	.01	.23	.29	.01	.01	.22	.28	.01	.01	.21	.27	2
3	.02	.03	.30	.37	.02	.03	.30	.36	.02	.03	.29	.34	.02	.03	.28	.33	.02	.03	.27	.32	.01	.03	.26	.31	3
4	.03	.06	.36	.41	.03	.05	.34	.40	.03	.05	.33	.38	.03	.05	.32	.38	.03	.05	.31	.37	.03	.05	.30	.36	4
5	.05	.08	.40	.46	.05	.08	.38	.44	.05	.08	.37	.44	.05	.07	.36	.42	.05	.07	.36	.41	.04	.07	.35	.39	5
6	.08	.11	.44	.50	.07	.11	.42	.49	.07	.10	.41	.48	.07	.10	.41	.46	.07	.09	.39	.44	.06	.09	.38	.43	6
7	.10	.13	.48	.54	.10	.12	.47	.53	.09	.12	.46	.52	.09	.12	.44	.50	.09	.11	.43	.48	.08	.11	.41	.47	7
8	.13	.16	.52	.59	.12	.15	.51	.56	.12	.15	.50	.56	.11	.14	.48	.54	.11	.14	.46	.52	.10	.13	.45	.51	8
9	.16	.19	.56	.63	.15	.19	.54	.60	.14	.18	.54	.59	.14	.17	.52	.58	.13	.17	.50	.56	.13	.16	.48	.54	9
10	.18	.22	.60	.66	.17	.21	.58	.64	.17	.20	.57	.62	.16	.19	.56	.62	.16	.18	.54	.59	.15	.18	.52	.57	10
11	.21	.25	.64	.69	.19	.24	.62	.68	.18	.23	.60	.66	.18	.23	.59	.64	.17	.22	.57	.63	.16	.21	.55	.61	11
12	.25	.30	.68	.74	.23	.28	.66	.70	.22	.27	.63	.70	.21	.26	.62	.67	.21	.25	.61	.65	.20	.24	.59	.64	12
13	.26	.32	.70	.75	.25	.30	.70	.75	.24	.29	.67	.72	.23	.28	.65	.71	.22	.27	.64	.68	.22	.26	.62	.67	13
14	.31	.36	.75	.79	.30	.34	.72	.77	.28	.33	.71	.76	.27	.32	.68	.73	.26	.31	.66	.72	.25	.30	.65	.69	14
15	.34	.40	.78	.82	.32	.38	.76	.81	.30	.37	.73	.78	.29	.35	.72	.77	.28	.34	.69	.74	.27	.32	.68	.73	15

Source: After Blyth and Still, 1983.

Inner entries give the 95% interval, and outer entries the 99% interval. For example, for $n = 13$, $u = 3$, the 95% interval is (0.07, 0.52) and the 99% interval is (0.04, 0.59). n = number of observations. u = number of those that exceed some specified value x_u.

Source: Gilbert (1987).

Table B-13.
Factors for Calculating Normal Distribution One-Sided Tolerance Bounds

Factors $g'_{(1-\alpha,p,n)}$ for a Normal One-Sided $(1-\alpha)100\%$ Tolerance Bound

		$p = 0.600$					$p = 0.700$					$p = 0.800$					
n	$1-\alpha$:	0.800	0.900	0.950	0.975	0.990	0.800	0.900	0.950	0.975	0.990	0.800	0.900	0.950	0.975	0.990	n
2		1.577	3.343	6.778	13.602	34.038	2.357	4.881	9.843	19.726	49.344	3.417	6.987	14.051	28.140	70.376	2
3		0.991	1.602	2.399	3.484	5.593	1.441	2.228	3.277	4.722	7.547	2.016	3.039	4.424	6.343	10.111	3
4		0.819	1.219	1.672	2.209	3.102	1.199	1.693	2.265	2.954	4.112	1.675	2.295	3.026	3.915	5.417	4
5		0.729	1.042	1.370	1.732	2.287	1.080	1.456	1.861	2.315	3.020	1.514	1.976	2.483	3.058	3.958	5
6		0.672	0.935	1.199	1.478	1.884	1.006	1.318	1.638	1.982	2.490	1.417	1.795	2.191	2.621	3.262	6
7		0.631	0.862	1.087	1.317	1.642	0.955	1.225	1.495	1.775	2.176	1.352	1.676	2.005	2.353	2.854	7
8		0.600	0.808	1.006	1.205	1.478	0.917	1.158	1.393	1.633	1.967	1.304	1.590	1.875	2.170	2.584	8
9		0.576	0.766	0.945	1.121	1.358	0.888	1.107	1.317	1.528	1.816	1.266	1.525	1.779	2.036	2.391	9
10		0.556	0.733	0.896	1.055	1.267	0.864	1.066	1.257	1.446	1.701	1.237	1.474	1.703	1.933	2.246	10
11		0.540	0.705	0.856	1.002	1.194	0.844	1.032	1.208	1.381	1.610	1.212	1.433	1.643	1.851	2.131	11
12		0.526	0.681	0.823	0.958	1.134	0.827	1.004	1.168	1.327	1.537	1.192	1.398	1.593	1.784	2.039	12
13		0.513	0.661	0.794	0.921	1.084	0.813	0.980	1.133	1.282	1.475	1.174	1.368	1.551	1.728	1.963	13
14		0.502	0.643	0.770	0.889	1.041	0.800	0.959	1.104	1.243	1.424	1.159	1.343	1.514	1.681	1.898	14
15		0.493	0.628	0.748	0.861	1.005	0.789	0.940	1.078	1.210	1.379	1.145	1.321	1.483	1.639	1.843	15
16		0.484	0.614	0.729	0.836	0.972	0.779	0.924	1.056	1.180	1.340	1.133	1.301	1.455	1.603	1.795	16
17		0.477	0.601	0.712	0.814	0.944	0.770	0.910	1.035	1.154	1.306	1.123	1.284	1.431	1.572	1.753	17
18		0.470	0.590	0.696	0.795	0.918	0.762	0.896	1.017	1.131	1.275	1.113	1.268	1.409	1.543	1.716	18
19		0.463	0.580	0.682	0.777	0.895	0.755	0.885	1.001	1.110	1.248	1.104	1.254	1.389	1.518	1.682	19
20		0.458	0.570	0.669	0.761	0.875	0.748	0.874	0.986	1.091	1.223	1.096	1.241	1.371	1.495	1.652	20
21		0.452	0.562	0.658	0.746	0.856	0.742	0.864	0.972	1.073	1.200	1.089	1.229	1.355	1.474	1.625	21
22		0.447	0.554	0.647	0.732	0.838	0.736	0.855	0.960	1.057	1.180	1.082	1.218	1.340	1.455	1.600	22
23		0.443	0.546	0.637	0.720	0.822	0.731	0.846	0.948	1.043	1.161	1.076	1.208	1.326	1.437	1.577	23
24		0.438	0.540	0.628	0.708	0.808	0.726	0.838	0.937	1.029	1.144	1.070	1.199	1.313	1.421	1.556	24
25		0.434	0.533	0.619	0.698	0.794	0.722	0.831	0.927	1.017	1.128	1.065	1.190	1.302	1.406	1.537	25
26		0.430	0.527	0.611	0.687	0.781	0.717	0.824	0.918	1.005	1.113	1.060	1.182	1.291	1.392	1.519	26
27		0.427	0.522	0.604	0.678	0.769	0.713	0.818	0.910	0.994	1.099	1.055	1.174	1.280	1.379	1.502	27
28		0.423	0.516	0.596	0.669	0.758	0.710	0.812	0.901	0.984	1.086	1.051	1.167	1.271	1.367	1.486	28
29		0.420	0.511	0.590	0.661	0.748	0.706	0.806	0.894	0.974	1.073	1.047	1.160	1.262	1.355	1.472	29
30		0.417	0.506	0.583	0.653	0.738	0.703	0.801	0.886	0.965	1.062	1.043	1.154	1.253	1.344	1.458	30
35		0.404	0.486	0.556	0.619	0.696	0.688	0.778	0.856	0.927	1.014	1.026	1.127	1.217	1.299	1.400	35
40		0.394	0.470	0.535	0.593	0.663	0.677	0.760	0.831	0.896	0.976	1.013	1.106	1.188	1.263	1.356	40
50		0.379	0.446	0.503	0.554	0.615	0.659	0.732	0.795	0.852	0.920	0.993	1.075	1.146	1.211	1.291	50
60		0.367	0.428	0.480	0.525	0.580	0.647	0.713	0.769	0.820	0.881	0.978	1.052	1.116	1.174	1.245	60
120		0.333	0.375	0.411	0.442	0.478	0.609	0.655	0.693	0.727	0.767	0.936	0.986	1.029	1.068	1.113	120
240		0.309	0.339	0.363	0.385	0.410	0.584	0.615	0.642	0.665	0.692	0.907	0.942	0.971	0.997	1.028	240
480		0.293	0.313	0.331	0.346	0.363	0.566	0.588	0.606	0.622	0.641	0.887	0.912	0.932	0.950	0.971	480
∞		0.253	0.253	0.253	0.253	0.253	0.524	0.524	0.524	0.524	0.524	0.842	0.842	0.842	0.842	0.842	∞

The factors in this table can also be used to compute two-sided confidence intervals and one-sided confidence bouds for normal distribution percentiles; see Section 4.4. The factors in this table were computed with an algorithm provided by Robert E. Odeh.

Factors $g'_{(1-\alpha,p,n)}$ for a Normal One-Sided $(1-\alpha)100\%$ Tolerance Bound

		$p = 0.900$					$p = 0.950$					$p = 0.990$					
n	$1-\alpha$:	0.800	0.900	0.950	0.975	0.990	0.800	0.900	0.950	0.975	0.990	0.800	0.900	0.950	0.975	0.990	n
2		5.049	10.253	20.581	41.201	103.029	6.464	13.090	26.260	52.559	131.426	9.156	18.500	37.094	74.234	185.617	2
3		2.871	4.258	6.155	8.797	13.995	3.604	5.311	7.656	10.927	17.370	5.010	7.340	10.553	15.043	23.896	3
4		2.372	3.188	4.162	5.354	7.380	2.968	3.957	5.144	6.602	9.083	4.110	5.438	7.042	9.018	12.387	4
5		2.145	2.742	3.407	4.166	5.362	2.683	3.400	4.203	5.124	6.578	3.711	4.666	5.741	6.980	8.939	5
6		2.012	2.494	3.006	3.568	4.411	2.517	3.092	3.708	4.385	5.406	3.482	4.243	5.062	5.967	7.335	6
7		1.923	2.333	2.755	3.206	3.859	2.407	2.894	3.399	3.940	4.728	3.331	3.972	4.642	5.361	6.412	7
8		1.859	2.219	2.582	2.960	3.497	2.328	2.754	3.187	3.640	4.285	3.224	3.783	4.354	4.954	5.812	8
9		1.809	2.133	2.454	2.783	3.240	2.268	2.650	3.031	3.424	3.972	3.142	3.641	4.143	4.662	5.389	9
10		1.770	2.066	2.355	2.647	3.048	2.220	2.568	2.911	3.259	3.738	3.078	3.532	3.981	4.440	5.074	10
11		1.738	2.011	2.275	2.540	2.898	2.182	2.503	2.815	3.129	3.556	3.026	3.443	3.852	4.265	4.829	11
12		1.711	1.966	2.210	2.452	2.777	2.149	2.448	2.736	3.023	3.410	2.982	3.371	3.747	4.124	4.633	12
13		1.689	1.928	2.155	2.379	2.677	2.122	2.402	2.671	2.936	3.290	2.946	3.309	3.659	4.006	4.472	13
14		1.669	1.895	2.109	2.317	2.593	2.098	2.363	2.614	2.861	3.189	2.914	3.257	3.585	3.907	4.337	14
15		1.652	1.867	2.068	2.264	2.521	2.078	2.329	2.566	2.797	3.102	2.887	3.212	3.520	3.822	4.222	15
16		1.637	1.842	2.033	2.218	2.459	2.059	2.299	2.524	2.742	3.028	2.863	3.172	3.464	3.749	4.123	16
17		1.623	1.819	2.002	2.177	2.405	2.043	2.272	2.486	2.693	2.963	2.841	3.137	3.414	3.684	4.037	17
18		1.611	1.800	1.974	2.141	2.357	2.029	2.249	2.453	2.650	2.905	2.822	3.105	3.370	3.627	3.960	18
19		1.600	1.782	1.949	2.108	2.314	2.016	2.227	2.423	2.611	2.854	2.804	3.077	3.331	3.575	3.892	19
20		1.590	1.765	1.926	2.079	2.276	2.004	2.208	2.396	2.576	2.808	2.789	3.052	3.295	3.529	3.832	20
21		1.581	1.750	1.905	2.053	2.241	1.993	2.190	2.371	2.544	2.766	2.774	3.028	3.263	3.487	3.777	21
22		1.572	1.737	1.886	2.028	2.209	1.983	2.174	2.349	2.515	2.729	2.761	3.007	3.233	3.449	3.727	22
23		1.564	1.724	1.869	2.006	2.180	1.973	2.159	2.328	2.489	2.694	2.749	2.987	3.206	3.414	3.681	23
24		1.557	1.712	1.853	1.985	2.154	1.965	2.145	2.309	2.465	2.662	2.738	2.969	3.181	3.382	3.640	24
25		1.550	1.702	1.838	1.966	2.129	1.957	2.132	2.292	2.442	2.633	2.727	2.952	3.158	3.353	3.601	25
26		1.544	1.691	1.824	1.949	2.106	1.949	2.120	2.275	2.421	2.606	2.718	2.937	3.136	3.325	3.566	26
27		1.538	1.682	1.811	1.932	2.085	1.943	2.109	2.260	2.402	2.581	2.708	2.922	3.116	3.300	3.533	27
28		1.533	1.673	1.799	1.917	2.065	1.936	2.099	2.246	2.384	2.558	2.700	2.909	3.098	3.276	3.502	28
29		1.528	1.665	1.788	1.903	2.047	1.930	2.089	2.232	2.367	2.536	2.692	2.896	3.080	3.254	3.473	29
30		1.523	1.657	1.777	1.889	2.030	1.924	2.080	2.220	2.351	2.515	2.684	2.884	3.064	3.233	3.447	30
35		1.502	1.624	1.732	1.833	1.957	1.900	2.041	2.167	2.284	2.430	2.652	2.833	2.995	3.145	3.334	35
40		1.486	1.598	1.697	1.789	1.902	1.880	2.010	2.125	2.232	2.364	2.627	2.793	2.941	3.078	3.249	40
50		1.461	1.559	1.646	1.724	1.821	1.852	1.965	2.065	2.156	2.269	2.590	2.735	2.862	2.980	3.125	50
60		1.444	1.532	1.609	1.679	1.764	1.832	1.933	2.022	2.103	2.202	2.564	2.694	2.807	2.911	3.038	60
120		1.393	1.452	1.503	1.549	1.604	1.772	1.841	1.899	1.952	2.015	2.488	2.574	2.649	2.716	2.797	120
240		1.358	1.399	1.434	1.465	1.501	1.733	1.780	1.819	1.854	1.896	2.437	2.497	2.547	2.591	2.645	240
480		1.335	1.363	1.387	1.408	1.433	1.706	1.738	1.766	1.790	1.818	2.403	2.444	2.479	2.509	2.545	480
∞		1.282	1.282	1.282	1.282	1.282	1.645	1.645	1.645	1.645	1.645	2.326	2.326	2.326	2.326	2.326	∞

The factors in this table can also be used to compute two-sided confidence intervals and one-sided confidence bouds for normal distribution percentiles; see Section 4.4. The factors in this table were computed with an algorithm provided by Robert E. Odeh.

Source: Hahn and Meeker (1991).

Table B-14.
Factors for Calculating Normal Distribution Two-Sided Tolerance Intervals

Factors $g_{(1-\alpha,p,n)}$ for a Normal Two-Sided $(1-\alpha)100\%$ Tolerance Intervals to Contain at Least $p100\%$ of the Population

	p = 0.90			p = 0.95			p = 0.99		
1 - α	0.90	0.95	0.99	0.9	0.95	0.99	0.90	0.95	0.99
n									
10	2.535	2.838	3.582	3.021	3.3819	4.268	3.970	4.445	5.609
11	2.463	2.737	3.397	2.935	3.2612	4.047	3.857	4.286	5.319
12	2.404	2.655	3.249	2.865	3.1633	3.872	3.765	4.157	5.089
13	2.355	2.587	3.129	2.806	3.0821	3.729	3.688	4.051	4.900
14	2.313	2.529	3.029	2.757	3.0135	3.610	3.623	3.960	4.744
15	2.278	2.480	2.944	2.714	2.9548	3.508	3.567	3.883	4.611
16	2.246	2.437	2.872	2.676	2.9038	3.422	3.517	3.816	4.497
17	2.219	2.399	2.808	2.644	2.859	3.346	3.474	3.757	4.398
18	2.194	2.366	2.753	2.614	2.8194	3.280	3.436	3.705	4.311
19	2.172	2.337	2.703	2.588	2.7841	3.221	3.402	3.659	4.233
20	2.152	2.310	2.659	2.565	2.7523	3.169	3.371	3.617	4.164
25	2.077	2.208	2.494	2.475	2.6313	2.972	3.252	3.458	3.906
30	2.025	2.140	2.385	2.413	2.5496	2.842	3.171	3.351	3.735
35	1.988	2.090	2.306	2.368	2.4902	2.748	3.112	3.273	3.612
40	1.959	2.052	2.247	2.334	2.4446	2.677	3.067	3.213	3.518
50	1.916	1.996	2.162	2.284	2.3788	2.576	3.001	3.126	3.385
60	1.887	1.958	2.103	2.249	2.3329	2.506	2.955	3.066	3.293
70	1.865	1.929	2.060	2.222	2.2987	2.454	2.921	3.021	3.225
80	1.848	1.907	2.026	2.202	2.2721	2.414	2.894	2.986	3.173
90	1.834	1.889	1.999	2.185	2.2506	2.382	2.872	2.958	3.130
100	1.823	1.874	1.977	2.172	2.2328	2.356	2.854	2.934	3.096
∞	1.645	1.645	1.645	1.960	1.960	1.960	2.576	2.576	2.576

Table B-15.
Standard Normal Distribution

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003369	0.0003248	0.0003131	0.0003018	0.0002909	0.0002803	0.0002701	0.0002602	0.0002507	0.0002415
-3.3	0.0004834	0.0004665	0.0004501	0.0004342	0.0004189	0.0004041	0.0003897	0.0003758	0.0003624	0.0003495
-3.2	0.0006871	0.0006637	0.0006410	0.0006190	0.0005976	0.0005770	0.0005571	0.0005377	0.0005190	0.0005009
-3.1	0.0009676	0.0009354	0.0009043	0.0008740	0.0008447	0.0008164	0.0007888	0.0007622	0.0007364	0.0007114
-3.0	0.001350	0.001306	0.001264	0.001223	0.001183	0.001144	0.001107	0.001070	0.001035	0.001001
-2.9	0.001866	0.001807	0.001750	0.001695	0.001641	0.001589	0.001538	0.001489	0.001441	0.001395
-2.8	0.002555	0.002477	0.002401	0.002327	0.002256	0.002186	0.002118	0.002052	0.001988	0.001926
-2.7	0.003467	0.003364	0.003264	0.003167	0.003072	0.002980	0.002890	0.002803	0.002718	0.002635
-2.6	0.004661	0.004527	0.004396	0.004269	0.004145	0.004025	0.003907	0.003793	0.003681	0.003573
-2.5	0.006210	0.006037	0.005868	0.005703	0.005543	0.005386	0.005234	0.005085	0.004940	0.004799
-2.4	0.008198	0.007976	0.007760	0.007549	0.007344	0.007143	0.006947	0.006756	0.006569	0.006387
-2.3	0.01072	0.01044	0.01017	0.009903	0.009642	0.009387	0.009137	0.008894	0.008656	0.008424
-2.2	0.01390	0.01355	0.01321	0.01287	0.01255	0.01222	0.01191	0.01160	0.01130	0.01101
-2.1	0.01786	0.01743	0.01700	0.01659	0.01618	0.01578	0.01539	0.01500	0.01463	0.01426
-2.0	0.02275	0.02222	0.02169	0.02118	0.02068	0.02018	0.01970	0.01923	0.01876	0.01831
-1.9	0.02872	0.02807	0.02743	0.02680	0.02619	0.02559	0.02500	0.02442	0.02385	0.02330
-1.8	0.03593	0.03515	0.03438	0.03362	0.03288	0.03216	0.03144	0.03074	0.03005	0.02938
-1.7	0.04457	0.04363	0.04272	0.04182	0.04093	0.04006	0.03920	0.03836	0.03754	0.03673
-1.6	0.05480	0.05370	0.05262	0.05155	0.05050	0.04947	0.04846	0.04746	0.04648	0.04551
-1.5	0.06681	0.06552	0.06426	0.06301	0.06178	0.06057	0.05938	0.05821	0.05705	0.05592
-1.4	0.08076	0.07927	0.07780	0.07636	0.07493	0.07353	0.07215	0.07078	0.06944	0.06811
-1.3	0.09680	0.09510	0.09342	0.09176	0.09012	0.08851	0.08691	0.08534	0.08379	0.08226
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.09853
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

NOTE: Table generated using SAS, a statistical software package. The table entries are values of p, where $p = P(Z \leq Z_p)$. For example, $P(Z \leq 1.65) = 0.9505$

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

3.5 0.9998
4.0 1.000
4.5 1.000
5.0 1.000

NOTE: Table generated using SAS, a statistical software package. The table entries are values of p, where $p = P(Z \leq Z_p)$. For example, $P(Z \leq 1.65) = 0.9505$

Table B-16.
Poisson Probabilities

	μ									
x	**0.005**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**
0	0.9950	0.9900	0.9802	0.9704	0.9608	0.9512	0.9418	0.9324	0.9231	0.9139
1	0.004975	0.009900	0.01960	0.02911	0.03843	0.04756	0.05651	0.06527	0.07385	0.08225
2	0.00001244	0.00004950	0.0001960	0.0004367	0.0007686	0.001189	0.001695	0.002284	0.002954	0.003701
3	0.00000002073	0.0000001650	0.000001307	0.000004367	0.00001025	0.00001982	0.00003390	0.00005330	0.00007877	0.0001110
x	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
0	0.9048	0.8187	0.7408	0.6703	0.6065	0.5488	0.4966	0.4493	0.4066	0.3679
1	0.09048	0.1637	0.2222	0.2681	0.3033	0.3293	0.3476	0.3595	0.3659	0.3679
2	0.004524	0.01637	0.03334	0.05363	0.07582	0.09879	0.1217	0.1438	0.1647	0.1839
3	0.0001508	0.001092	0.003334	0.007150	0.01264	0.01976	0.02839	0.03834	0.04940	0.06131
4	0.000003770	0.00005458	0.0002500	0.0007150	0.001580	0.002964	0.004968	0.007669	0.01111	0.01533
5	0.00000007540	0.000002183	0.00001500	0.00005720	0.0001580	0.0003556	0.0006955	0.001227	0.002001	0.003066
6	0.000000001257	0.00000007278	0.0000007501	0.000003813	0.00001316	0.00003556	0.00008114	0.0001636	0.0003001	0.0005109
7	0.00000000001795	0.000000002079	0.00000003215	0.0000002179	0.0000009402	0.000003048	0.000008114	0.00001870	0.00003858	0.00007299
x	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**2.0**
0	0.3329	0.3012	0.2725	0.2466	0.2231	0.2019	0.1827	0.1653	0.1496	0.1353
1	0.3662	0.3614	0.3543	0.3452	0.3347	0.3230	0.3106	0.2975	0.2842	0.2707
2	0.2014	0.2169	0.2303	0.2417	0.2510	0.2584	0.2640	0.2678	0.2700	0.2707
3	0.07384	0.08674	0.09979	0.1128	0.1255	0.1378	0.1496	0.1607	0.1710	0.1804
4	0.02031	0.02602	0.03243	0.03947	0.04707	0.05513	0.06357	0.07230	0.08122	0.09022
5	0.004467	0.006246	0.008432	0.01105	0.01412	0.01764	0.02162	0.02603	0.03086	0.03609
6	0.0008190	0.001249	0.001827	0.002579	0.003530	0.004705	0.006124	0.007809	0.009773	0.01203
7	0.0001287	0.0002141	0.0003393	0.0005158	0.0007564	0.001075	0.001487	0.002008	0.002653	0.003437
8	0.00001770	0.00003212	0.00005514	0.00009026	0.0001418	0.0002151	0.0003161	0.0004518	0.0006300	0.0008593
9	0.000002163	0.000004283	0.000007964	0.00001404	0.00002364	0.00003823	0.00005970	0.00009036	0.0001330	0.0001909
x	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**2.7**	**2.8**	**2.9**	**3.0**
0	0.1225	0.1108	0.1003	0.09072	0.08208	0.07427	0.06721	0.06081	0.05502	0.04979
1	0.2572	0.2438	0.2306	0.2177	0.2052	0.1931	0.1815	0.1703	0.1596	0.1494
2	0.2700	0.2681	0.2652	0.2613	0.2565	0.2510	0.2450	0.2384	0.2314	0.2240
3	0.1890	0.1966	0.2033	0.2090	0.2138	0.2176	0.2205	0.2225	0.2237	0.2240
4	0.09923	0.1082	0.1169	0.1254	0.1336	0.1414	0.1488	0.1557	0.1622	0.1680
5	0.04168	0.04759	0.05378	0.06020	0.06680	0.07354	0.08036	0.08721	0.09405	0.1008
6	0.01459	0.01745	0.02061	0.02408	0.02783	0.03187	0.03616	0.04070	0.04546	0.05041
7	0.004376	0.005484	0.006773	0.008255	0.009941	0.01184	0.01395	0.01628	0.01883	0.02160
8	0.001149	0.001508	0.001947	0.002477	0.003106	0.003847	0.004708	0.005698	0.006827	0.008102
9	0.0002680	0.0003686	0.0004976	0.0006604	0.0008629	0.001111	0.001412	0.001773	0.002200	0.002701
10	0.00005629	0.00008110	0.0001145	0.0001585	0.0002157	0.0002889	0.0003813	0.0004964	0.0006379	0.0008102
11	0.00001075	0.00001622	0.00002393	0.00003458	0.00004903	0.00006829	0.00009359	0.0001263	0.0001682	0.0002210
12	0.000001881	0.000002974	0.000004587	0.000006917	0.00001021	0.00001480	0.00002106	0.00002948	0.00004064	0.00005524
x	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**3.6**	**3.7**	**3.8**	**3.9**	**4.0**
0	0.04505	0.04076	0.03688	0.03337	0.03020	0.02732	0.02472	0.02237	0.02024	0.01832
1	0.1397	0.1304	0.1217	0.1135	0.1057	0.09837	0.09148	0.08501	0.07894	0.07326
2	0.2165	0.2087	0.2008	0.1929	0.1850	0.1771	0.1692	0.1615	0.1539	0.1465
3	0.2237	0.2226	0.2209	0.2186	0.2158	0.2125	0.2087	0.2046	0.2001	0.1954
4	0.1733	0.1781	0.1823	0.1858	0.1888	0.1912	0.1931	0.1944	0.1951	0.1954
5	0.1075	0.1140	0.1203	0.1264	0.1322	0.1377	0.1429	0.1477	0.1522	0.1563
6	0.05553	0.06079	0.06616	0.07160	0.07710	0.08261	0.08810	0.09355	0.09893	0.1042
7	0.02459	0.02779	0.03119	0.03478	0.03855	0.04248	0.04657	0.05079	0.05512	0.05954
8	0.009529	0.01112	0.01287	0.01478	0.01687	0.01912	0.02154	0.02412	0.02687	0.02977
9	0.003282	0.003952	0.004717	0.005584	0.006559	0.007647	0.008854	0.01019	0.01164	0.01323
10	0.001018	0.001265	0.001557	0.001899	0.002296	0.002753	0.003276	0.003870	0.004541	0.005292
11	0.0002868	0.0003679	0.0004670	0.0005868	0.0007304	0.0009010	0.001102	0.001337	0.001610	0.001925
12	0.00007408	0.00009811	0.0001284	0.0001663	0.0002130	0.0002703	0.0003398	0.0004234	0.0005232	0.0006415
13	0.00001766	0.00002415	0.00003260	0.00004349	0.00005736	0.00007485	0.00009671	0.0001238	0.0001570	0.0001974
14	0.000003911	0.000005520	0.000007684	0.00001056	0.00001434	0.00001925	0.00002556	0.00003359	0.00004373	0.00005640

x	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
0	0.01657	0.01500	0.01357	0.01228	0.01111	0.01005	0.009095	0.008230	0.007447	0.006738
1	0.06795	0.06298	0.05834	0.05402	0.04999	0.04624	0.04275	0.03950	0.03649	0.03369
2	0.1393	0.1323	0.1254	0.1188	0.1125	0.1063	0.1005	0.09481	0.08940	0.08422
3	0.1904	0.1852	0.1798	0.1743	0.1687	0.1631	0.1574	0.1517	0.1460	0.1404
4	0.1951	0.1944	0.1933	0.1917	0.1898	0.1875	0.1849	0.1820	0.1789	0.1755
5	0.1600	0.1633	0.1662	0.1687	0.1708	0.1725	0.1738	0.1747	0.1753	0.1755
6	0.1093	0.1143	0.1191	0.1237	0.1281	0.1323	0.1362	0.1398	0.1432	0.1462
7	0.06404	0.06859	0.07318	0.07778	0.08236	0.08692	0.09143	0.09586	0.1002	0.1044
8	0.03282	0.03601	0.03933	0.04278	0.04633	0.04998	0.05371	0.05752	0.06138	0.06528
9	0.01495	0.01681	0.01879	0.02091	0.02316	0.02554	0.02805	0.03068	0.03342	0.03627
10	0.006130	0.007058	0.008081	0.009202	0.01042	0.01175	0.01318	0.01472	0.01637	0.01813
11	0.002285	0.002695	0.003159	0.003681	0.004264	0.004914	0.005633	0.006425	0.007294	0.008242
12	0.0007807	0.0009432	0.001132	0.001350	0.001599	0.001884	0.002206	0.002570	0.002978	0.003434
13	0.0002462	0.0003047	0.0003744	0.0004568	0.0005536	0.0006665	0.0007976	0.0009489	0.001123	0.001321
14	0.00007210	0.00009142	0.0001150	0.0001436	0.0001779	0.0002190	0.0002678	0.0003254	0.0003929	0.0004717
15	0.00001971	0.00002560	0.00003297	0.00004211	0.00005338	0.00006716	0.00008390	0.0001041	0.0001284	0.0001572

x	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0
0	0.006097	0.005517	0.004992	0.004517	0.004087	0.003698	0.003346	0.003028	0.002739	0.002479
1	0.03109	0.02869	0.02646	0.02439	0.02248	0.02071	0.01907	0.01756	0.01616	0.01487
2	0.07929	0.07458	0.07011	0.06585	0.06181	0.05798	0.05436	0.05092	0.04768	0.04462
3	0.1348	0.1293	0.1239	0.1185	0.1133	0.1082	0.1033	0.09845	0.09377	0.08924
4	0.1719	0.1681	0.1641	0.1600	0.1558	0.1515	0.1472	0.1428	0.1383	0.1339
5	0.1753	0.1748	0.1740	0.1728	0.1714	0.1697	0.1678	0.1656	0.1632	0.1606
6	0.1490	0.1515	0.1537	0.1555	0.1571	0.1584	0.1594	0.1601	0.1605	0.1606
7	0.1086	0.1125	0.1163	0.1200	0.1234	0.1267	0.1298	0.1326	0.1353	0.1377
8	0.06921	0.07314	0.07708	0.08099	0.08487	0.08870	0.09247	0.09616	0.09976	0.1033
9	0.03922	0.04226	0.04539	0.04859	0.05187	0.05519	0.05856	0.06197	0.06540	0.06884
10	0.02000	0.02198	0.02406	0.02624	0.02853	0.03091	0.03338	0.03594	0.03859	0.04130
11	0.009273	0.01039	0.01159	0.01288	0.01426	0.01573	0.01730	0.01895	0.02070	0.02253
12	0.003941	0.004502	0.005119	0.005797	0.006537	0.007343	0.008216	0.009160	0.01018	0.01126
13	0.001546	0.001801	0.002087	0.002408	0.002766	0.003163	0.003603	0.004087	0.004618	0.005199
14	0.0005632	0.0006688	0.0007901	0.0009288	0.001087	0.001265	0.001467	0.001693	0.001946	0.002228
15	0.0001915	0.0002319	0.0002792	0.0003344	0.0003984	0.0004724	0.0005574	0.0006547	0.0007655	0.0008913
16	0.00006104	0.00007535	0.00009248	0.0001128	0.0001370	0.0001653	0.0001986	0.0002373	0.0002823	0.0003342
17	0.00001831	0.00002305	0.00002883	0.00003585	0.00004431	0.00005446	0.00006658	0.00008097	0.00009797	0.0001180

x	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0
0	0.002243	0.002029	0.001836	0.001662	0.001503	0.001360	0.001231	0.001114	0.001008	0.0009119
1	0.01368	0.01258	0.01157	0.01063	0.009772	0.008978	0.008247	0.007574	0.006954	0.006383
2	0.04173	0.03901	0.03644	0.03403	0.03176	0.02963	0.02763	0.02575	0.02399	0.02234
3	0.08485	0.08061	0.07653	0.07259	0.06881	0.06518	0.06170	0.05837	0.05518	0.05213
4	0.1294	0.1249	0.1205	0.1162	0.1118	0.1076	0.1034	0.09923	0.09518	0.09123
5	0.1579	0.1549	0.1519	0.1487	0.1454	0.1420	0.1385	0.1349	0.1314	0.1277
6	0.1605	0.1601	0.1595	0.1586	0.1575	0.1562	0.1546	0.1529	0.1511	0.1490
7	0.1399	0.1418	0.1435	0.1450	0.1462	0.1472	0.1480	0.1486	0.1489	0.1490
8	0.1066	0.1099	0.1130	0.1160	0.1188	0.1215	0.1240	0.1263	0.1284	0.1304
9	0.07228	0.07571	0.07911	0.08248	0.08581	0.08908	0.09229	0.09541	0.09846	0.1014
10	0.04409	0.04694	0.04984	0.05279	0.05578	0.05879	0.06183	0.06488	0.06794	0.07098
11	0.02445	0.02646	0.02855	0.03071	0.03296	0.03528	0.03766	0.04011	0.04261	0.04517
12	0.01243	0.01367	0.01499	0.01638	0.01785	0.01940	0.02103	0.02273	0.02450	0.02635
13	0.005832	0.006519	0.007263	0.008064	0.008926	0.009850	0.01084	0.01189	0.01301	0.01419
14	0.002541	0.002887	0.003268	0.003687	0.004144	0.004644	0.005186	0.005774	0.006410	0.007094
15	0.001033	0.001193	0.001373	0.001573	0.001796	0.002043	0.002317	0.002618	0.002949	0.003311
16	0.0003940	0.0004624	0.0005405	0.0006292	0.0007296	0.0008428	0.0009701	0.001113	0.001272	0.001448
17	0.0001414	0.0001686	0.0002003	0.0002369	0.0002790	0.0003272	0.0003823	0.0004450	0.0005161	0.0005964
18	0.00004791	0.00005809	0.00007010	0.00008422	0.0001007	0.0001200	0.0001423	0.0001681	0.0001978	0.0002319
19	0.00001538	0.00001895	0.00002324	0.00002837	0.00003446	0.00004168	0.00005018	0.00006017	0.00007185	0.00008545

x	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0
0	0.0008251	0.0007466	0.0006755	0.0006113	0.0005531	0.0005005	0.0004528	0.0004097	0.0003707	0.0003355
1	0.005858	0.005375	0.004931	0.004523	0.004148	0.003803	0.003487	0.003196	0.002929	0.002684
2	0.02080	0.01935	0.01800	0.01674	0.01556	0.01445	0.01342	0.01246	0.01157	0.01073
3	0.04922	0.04644	0.04380	0.04128	0.03889	0.03661	0.03446	0.03241	0.03047	0.02863
4	0.08736	0.08360	0.07993	0.07637	0.07292	0.06957	0.06633	0.06319	0.06017	0.05725
5	0.1241	0.1204	0.1167	0.1130	0.1094	0.1057	0.1021	0.09858	0.09507	0.09160
6	0.1468	0.1445	0.1420	0.1394	0.1367	0.1339	0.1311	0.1282	0.1252	0.1221
7	0.1489	0.1486	0.1481	0.1474	0.1465	0.1454	0.1442	0.1428	0.1413	0.1396
8	0.1321	0.1337	0.1351	0.1363	0.1373	0.1381	0.1388	0.1392	0.1395	0.1396
9	0.1042	0.1070	0.1096	0.1121	0.1144	0.1167	0.1187	0.1207	0.1224	0.1241
10	0.07402	0.07703	0.08000	0.08294	0.08583	0.08866	0.09143	0.09412	0.09673	0.09926
11	0.04777	0.05042	0.05309	0.05580	0.05852	0.06126	0.06400	0.06674	0.06947	0.07219
12	0.02827	0.03025	0.03230	0.03441	0.03658	0.03880	0.04107	0.04338	0.04574	0.04813
13	0.01544	0.01675	0.01814	0.01959	0.02110	0.02268	0.02432	0.02603	0.02779	0.02962
14	0.007829	0.008616	0.009457	0.01035	0.01130	0.01231	0.01338	0.01450	0.01568	0.01692
15	0.003706	0.004136	0.004602	0.005107	0.005652	0.006238	0.006867	0.007541	0.008260	0.009026
16	0.001644	0.001861	0.002100	0.002362	0.002649	0.002963	0.003305	0.003676	0.004078	0.004513
17	0.0006868	0.0007882	0.0009017	0.001028	0.001169	0.001325	0.001497	0.001687	0.001895	0.002124
18	0.0002709	0.0003153	0.0003657	0.0004227	0.0004870	0.0005593	0.0006404	0.0007309	0.0008318	0.0009439
19	0.0001012	0.0001195	0.0001405	0.0001646	0.0001922	0.0002237	0.0002595	0.0003001	0.0003459	0.0003974
20	0.00003594	0.00004301	0.00005128	0.00006092	0.00007209	0.00008502	0.00009991	0.0001170	0.0001366	0.0001590
21	0.00001215	0.00001475	0.00001783	0.00002147	0.00002575	0.00003077	0.00003663	0.00004347	0.00005139	0.00006056

x	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0
0	0.0003035	0.0002747	0.0002485	0.0002249	0.0002035	0.0001841	0.0001666	0.0001507	0.0001364	0.0001234
1	0.002459	0.002252	0.002063	0.001889	0.001729	0.001583	0.001449	0.001326	0.001214	0.001111
2	0.009958	0.009234	0.008560	0.007933	0.007350	0.006808	0.006304	0.005836	0.005402	0.004998
3	0.02689	0.02524	0.02368	0.02221	0.02083	0.01952	0.01828	0.01712	0.01602	0.01499
4	0.05444	0.05174	0.04914	0.04665	0.04425	0.04196	0.03977	0.03766	0.03566	0.03374
5	0.08820	0.08485	0.08158	0.07837	0.07523	0.07217	0.06919	0.06629	0.06347	0.06073
6	0.1191	0.1160	0.1128	0.1097	0.1066	0.1034	0.1003	0.09722	0.09414	0.09109
7	0.1378	0.1358	0.1338	0.1317	0.1294	0.1271	0.1247	0.1222	0.1197	0.1171
8	0.1395	0.1392	0.1388	0.1382	0.1375	0.1366	0.1356	0.1344	0.1332	0.1318
9	0.1256	0.1269	0.1280	0.1290	0.1299	0.1306	0.1311	0.1315	0.1317	0.1318
10	0.1017	0.1040	0.1063	0.1084	0.1104	0.1123	0.1140	0.1157	0.1172	0.1186
11	0.07488	0.07755	0.08018	0.08276	0.08530	0.08778	0.09020	0.09255	0.09482	0.09702
12	0.05055	0.05299	0.05546	0.05793	0.06042	0.06291	0.06539	0.06787	0.07033	0.07277
13	0.03149	0.03343	0.03541	0.03743	0.03951	0.04162	0.04376	0.04594	0.04815	0.05038
14	0.01822	0.01958	0.02099	0.02246	0.02399	0.02556	0.02720	0.02888	0.03061	0.03238
15	0.009840	0.01070	0.01162	0.01258	0.01359	0.01466	0.01577	0.01694	0.01816	0.01943
16	0.004981	0.005485	0.006025	0.006604	0.007221	0.007878	0.008577	0.009318	0.01010	0.01093
17	0.002374	0.002646	0.002942	0.003263	0.003610	0.003985	0.004389	0.004823	0.005289	0.005786
18	0.001068	0.001205	0.001357	0.001523	0.001705	0.001904	0.002122	0.002358	0.002615	0.002893
19	0.0004553	0.0005202	0.0005926	0.0006732	0.0007627	0.0008619	0.0009714	0.001092	0.001225	0.001370
20	0.0001844	0.0002133	0.0002459	0.0002827	0.0003242	0.0003706	0.0004226	0.0004805	0.0005451	0.0006167
21	0.00007113	0.00008328	0.00009720	0.0001131	0.0001312	0.0001518	0.0001751	0.0002014	0.0002310	0.0002643
22	0.00002619	0.00003104	0.00003667	0.00004318	0.00005069	0.00005933	0.00006923	0.00008055	0.00009345	0.0001081

x	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0
0	0.0001117	0.0001010	0.00009142	0.00008272	0.00007485	0.00006773	0.00006128	0.00005545	0.00005017	0.00004540
1	0.001016	0.0009296	0.0008502	0.0007776	0.0007111	0.0006502	0.0005944	0.0005434	0.0004967	0.0004540
2	0.004624	0.004276	0.003954	0.003655	0.003378	0.003121	0.002883	0.002663	0.002459	0.002270
3	0.01402	0.01311	0.01226	0.01145	0.01070	0.009987	0.009322	0.008698	0.008114	0.007567
4	0.03191	0.03016	0.02850	0.02691	0.02540	0.02397	0.02261	0.02131	0.02008	0.01892
5	0.05807	0.05549	0.05300	0.05059	0.04827	0.04602	0.04386	0.04177	0.03976	0.03783
6	0.08807	0.08509	0.08215	0.07926	0.07642	0.07363	0.07090	0.06822	0.06561	0.06306
7	0.1145	0.1118	0.1091	0.1064	0.1037	0.1010	0.09825	0.09551	0.09279	0.09008
8	0.1302	0.1286	0.1269	0.1251	0.1232	0.1212	0.1191	0.1170	0.1148	0.1126
9	0.1317	0.1315	0.1311	0.1306	0.1300	0.1293	0.1284	0.1274	0.1263	0.1251
10	0.1198	0.1210	0.1219	0.1228	0.1235	0.1241	0.1245	0.1249	0.1250	0.1251
11	0.09913	0.1012	0.1031	0.1049	0.1067	0.1083	0.1098	0.1112	0.1125	0.1137
12	0.07518	0.07755	0.07990	0.08219	0.08444	0.08663	0.08877	0.09084	0.09285	0.09478
13	0.05262	0.05488	0.05716	0.05943	0.06171	0.06398	0.06624	0.06848	0.07071	0.07291
14	0.03421	0.03607	0.03797	0.03990	0.04187	0.04387	0.04589	0.04794	0.05000	0.05208
15	0.02075	0.02212	0.02354	0.02501	0.02652	0.02808	0.02968	0.03132	0.03300	0.03472
16	0.01180	0.01272	0.01368	0.01469	0.01575	0.01685	0.01799	0.01918	0.02042	0.02170
17	0.006318	0.006884	0.007485	0.008123	0.008799	0.009513	0.01027	0.01106	0.01189	0.01276
18	0.003194	0.003518	0.003867	0.004242	0.004644	0.005074	0.005532	0.006021	0.006540	0.007091
19	0.001530	0.001704	0.001893	0.002099	0.002322	0.002563	0.002824	0.003105	0.003408	0.003732
20	0.0006960	0.0007837	0.0008802	0.0009864	0.001103	0.001230	0.001370	0.001522	0.001687	0.001866
21	0.0003016	0.0003433	0.0003898	0.0004415	0.0004989	0.0005625	0.0006327	0.0007101	0.0007952	0.0008886
22	0.0001248	0.0001436	0.0001648	0.0001887	0.0002155	0.0002455	0.0002790	0.0003163	0.0003578	0.0004039
23	0.00004936	0.00005743	0.00006663	0.00007710	0.00008899	0.0001025	0.0001177	0.0001348	0.0001540	0.0001756
24	0.00001872	0.00002201	0.00002582	0.00003020	0.00003523	0.00004098	0.00004755	0.00005503	0.00006354	0.00007317

Source: Kvanli et al. (1996).

Table B-17.
Critical Values for the Rank-Sum Test

n	α	*m*																		
		2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
2	**0.05**	0	0	0	1	1	1	2	2	2	2	3	3	4	4	4	4	5	5	5
	0.10	0	1	1	2	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8
3	**0.05**	0	1	1	2	3	3	4	5	5	6	6	7	8	8	9	10	10	11	12
	0.10	1	2	2	3	4	5	6	6	7	8	9	10	11	11	12	13	14	15	16
4	**0.05**	0	1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19
	0.10	1	2	4	5	6	7	8	10	11	12	13	14	16	17	18	19	21	22	23
5	**0.05**	1	2	3	5	6	7	9	10	12	13	14	16	17	19	20	21	23	24	26
	0.10	2	3	5	6	8	9	11	13	14	16	18	19	21	23	24	26	28	29	31
6	**0.05**	1	3	4	6	8	9	11	13	15	17	18	20	22	24	26	27	29	31	33
	0.10	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	35	37	39
7	**0.05**	1	3	5	7	9	12	14	16	18	20	22	25	27	29	31	34	36	38	40
	0.10	2	5	7	9	12	14	17	19	22	24	27	29	32	34	37	39	42	44	47
8	**0.05**	2	4	6	9	111	14	16	19	21	24	27	29	32	34	37	40	42	45	48
	0.10	3	6	8	11	4	17	20	23	25	28	31	34	37	40	43	46	49	52	55
9	**0.05**	2	5	7	10	13	16	19	22	25	28	31	34	37	40	43	46	49	52	55
	0.10	3	6	10	13	16	19	23	26	29	32	36	39	42	46	49	53	56	59	63
10	**0.05**	2	5	8	12	15	18	21	25	28	32	35	38	42	45	49	52	56	59	63
	0.10	4	7	11	14	18	22	25	29	33	37	40	44	48	52	55	59	63	67	71
11	**0.05**	2	6	9	13	17	20	24	28	32	35	39	43	47	51	55	58	62	66	70
	0.10	4	8	12	16	20	24	28	32	37	41	45	49	53	58	62	66	70	74	79
12	**0.05**	3	6	10	14	18	22	27	31	35	39	43	48	52	56	61	65	69	73	78
	0.10	5	9	13	18	22	27	31	36	40	45	50	54	59	64	68	73	78	82	87
13	**0.05**	3	7	11	16	20	25	29	34	38	43	48	52	57	62	66	71	76	81	85
	0.10	5	10	14	19	24	29	34	39	44	49	54	59	64	69	75	80	85	90	95
14	**0.05**	4	8	12	17	22	27	32	37	42	47	52	57	62	67	72	78	83	88	93
	0.10	5	11	16	21	26	32	37	42	48	53	59	64	70	75	81	86	92	98	103
15	**0.05**	4	8	13	19	24	29	34	40	45	51	56	62	67	73	78	84	89	95	101
	0.10	6	11	17	23	28	34	40	46	52	58	64	69	75	81	87	93	99	105	111
16	**0.05**	4	9	15	20	26	31	37	43	49	55	61	66	72	78	84	90	96	102	108
	0.10	6	12	18	24	30	37	43	49	55	62	68	75	81	87	94	100	107	113	120
17	**0.05**	4	10	16	21	27	34	40	46	52	58	65	71	78	84	90	97	103	110	116
	0.10	7	13	19	26	32	39	46	53	59	66	73	80	86	93	100	107	114	121	128

n	α	*m*																		
		2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
18	**0.05**	**5**	10	**17**	**23**	**29**	**36**	**42**	**49**	**56**	**62**	69	**76**	**83**	89	96	**103**	110	**117**	**124**
	0.10	**7**	14	**21**	28	**35**	**42**	49	**56**	**63**	70	78	**85**	**92**	99	**107**	**114**	**121**	**129**	**136**
19	**0.05**	**5**	**11**	18	24	**31**	**38**	45	**52**	**59**	66	**73**	81	88	**95**	**102**	110	**117**	**124**	**131**
	0.10	8	**15**	**22**	**29**	**37**	44	**52**	**59**	**67**	**74**	82	90	98	**105**	**113**	**121**	**129**	**136**	144
20	**0.05**	**5**	**12**	19	**26**	**33**	40	48	**55**	**63**	70	78	**85**	**93**	**101**	108	**116**	**124**	**131**	**139**
	0.10	8	16	23	31	39	47	55	63	71	79	87	95	103	111	120	128	136	144	152

Source: EPA/600/R-96/084.

Table B-18.
Approximate Critical Values (λ_r) for Rosner's Test

n	r	α 0.05	α 0.01
25	1	2.82	3.14
	2	2.80	3.11
	3	2.78	3.09
	4	2.76	3.06
	5	2.73	3.03
	10	2.59	2.85
26	1	2.84	3.16
	2	2.82	3.14
	3	2.80	3.11
	4	2.78	3.09
	5	2.76	3.06
	10	2.62	2.89
27	1	2.86	3.18
	2	2.84	3.16
	3	2.82	3.14
	4	2.80	3.11
	5	2.78	3.09
	10	2.65	2.93
28	1	2.88	3.20
	2	2.86	3.18
	3	2.84	3.16
	4	2.82	3.14
	5	2.80	3.11
	10	2.68	2.97
29	1	2.89	3.22
	2	2.88	3.20
	3	2.86	3.18
	4	2.84	3.16
	5	2.82	3.14
	10	2.71	3.00
30	1	2.91	3.24
	2	2.89	3.22
	3	2.88	3.20
	4	2.86	3.18
	5	2.84	3.16
	10	2.73	3.03
31	1	2.92	3.25
	2	2.91	3.24
	3	2.89	3.22
	4	2.88	3.20
	5	2.86	3.18
	10	2.76	3.06
32	1	2.94	3.27
	2	2.92	3.25
	3	2.91	3.24
	4	2.89	3.22
	5	2.88	3.20
	10	2.78	3.09
33	1	2.95	3.29
	2	2.94	3.27
	3	2.92	3.25
	4	2.91	3.24
	5	2.89	3.22
	10	2.80	3.11
34	1	2.97	3.30
	2	2.95	3.29
	3	2.94	3.27
	4	2.92	3.25
	5	2.91	3.24
	10	2.82	3.14
35	1	2.98	3.32
	2	2.97	3.30
	3	2.95	3.29
	4	2.94	3.27
	5	2.92	3.25
	10	2.84	3.16
36	1	2.99	3.33
	2	2.98	3.32
	3	2.97	3.30
	4	2.95	3.29
	5	2.94	3.27
	10	2.86	3.18
37	1	3.00	3.34
	2	2.99	3.33
	3	2.98	3.32
	4	2.97	3.30
	5	2.95	3.29
	10	2.88	3.20
38	1	3.01	3.36
	2	3.00	3.34
	3	2.99	3.33
	4	2.98	3.32
	5	2.97	3.30
	10	2.91	3.22
39	1	3.03	3.37
	2	3.01	3.36
	3	3.00	3.34
	4	2.99	3.33
	5	2.98	3.32
	10	2.91	3.24
40	1	3.04	3.38
	2	3.03	3.37
	3	3.01	3.36
	4	3.00	3.34
	5	2.99	3.33
	10	2.92	3.25
41	1	3.05	3.39
	2	3.04	3.38
	3	3.03	3.37
	4	3.01	3.36
	5	3.00	3.34
	10	2.94	3.27
42	1	3.06	3.40
	2	3.05	3.39
	3	3.04	3.38
	4	3.03	3.37
	5	3.01	3.36
	10	2.95	3.29
43	1	3.07	3.41
	2	3.06	3.40
	3	3.05	3.39
	4	3.04	3.38
	5	3.03	3.37
	10	2.97	3.30
44	1	3.08	3.43
	2	3.07	3.41
	3	3.06	3.40
	4	3.05	3.39
	5	3.04	3.38
	10	2.98	3.32
45	1	3.09	3.44
	2	3.08	3.43
	3	3.07	3.41
	4	3.06	3.40
	5	3.05	3.39
	10	2.99	3.33

n	r	α 0.05	α 0.01
46	1	3.09	3.45
	2	3.09	3.44
	3	3.08	3.43
	4	3.07	3.41
	5	3.06	3.40
	10	3.00	3.34
47	1	3.10	3.46
	2	3.09	3.45
	3	3.09	3.44
	4	3.08	3.43
	5	3.07	3.41
	10	3.01	3.36
48	1	3.11	3.46
	2	3.10	3.46
	3	3.09	3.45
	4	3.09	3.44
	5	3.08	3.43
	10	3.03	3.37
49	1	3.12	3.47
	2	3.11	3.46
	3	3.10	3.46
	4	3.09	3.45
	5	3.09	3.44
	10	3.04	3.38
50	1	3.13	3.48
	2	3.12	3.47
	3	3.11	3.46
	4	3.10	3.46
	5	3.09	3.45
	10	3.05	3.39
60	1	3.20	3.56
	2	3.19	3.55
	3	3.19	3.55
	4	3.18	3.54
	5	3.17	3.53
	10	3.14	3.49
70	1	3.26	3.62
	2	3.25	3.62
	3	3.25	3.61
	4	3.24	3.60
	5	3.24	3.60
	10	3.21	3.57
80	1	3.31	3.67
	2	3.30	3.67
	3	3.30	3.66
	4	3.29	3.66
	5	3.29	3.65
	10	3.26	3.63
90	1	3.35	3.72
	2	3.34	3.71
	3	3.34	3.71
	4	3.34	3.70
	5	3.33	3.70
	10	3.31	3.68
100	1	3.38	3.75
	2	3.38	3.75
	3	3.38	3.75
	4	3.37	3.74
	5	3.37	3.74
	10	3.35	3.72
150	1	3.52	3.89
	2	3.51	3.89
	3	3.51	3.89
	4	3.51	3.88
	5	3.51	3.88
	10	3.50	3.87
200	1	3.61	3.98
	2	3.60	3.98
	3	3.60	3.97
	4	3.60	3.97
	5	3.60	3.97
	10	3.59	3.96
250	1	3.67	4.04
	5	3.67	4.04
	10	3.66	4.03
300	1	3.72	4.09
	5	3.72	4.09
	10	3.71	4.09
350	1	3.77	4.14
	5	3.76	4.13
	10	3.76	4.13
400	1	3.80	4.17
	5	3.80	4.17
	10	3.80	4.16
450	1	3.84	4.20
	5	3.83	4.20
	10	3.83	4.20
500	1	3.86	4.23
	5	3.86	4.23
	10	3.86	4.22

Source: EPA/600/R-96/084.

Table B-19.
Coefficients for the Shapiro-Wilk W Test for Normality

i \ n	2	3	4	5	6	7	8	9	10
1	0.7071	0.7071	0.6872	0.6646	0.6431	0.6233	0.6052	0.5888	0.5739
2	-	0.0000	0.1677	0.2413	0.2806	0.3031	0.3164	0.3244	0.3291
3	-	-	-	0.0000	0.0875	0.1401	0.1743	0.1976	0.2141
4	-	-	-	-	-	0.0000	0.0561	0.0947	0.1224
5	-	-	-	-	-	-	-	0.0000	0.0399

i \ n	11	12	13	14	15	16	17	18	19	20
1	0.5601	0.5475	0.5359	0.5251	0.5150	0.5056	0.4968	0.4886	0.4808	0.4734
2	0.3315	0.3325	0.3325	0.3318	0.3306	0.3290	0.3273	0.3253	0.3232	0.3211
3	0.2260	0.2347	0.2412	0.2460	0.2495	0.2521	0.2540	0.2553	0.2561	0.2565
4	0.1429	0.1586	0.1707	0.1802	0.1878	0.1939	0.1988	0.2027	0.2059	0.2085
5	0.0695	0.0922	0.1099	0.1240	0.1353	0.1447	0.1524	0.1587	0.1641	0.1686
6	0.0000	0.0303	0.0539	0.0727	0.0880	0.1005	0.1109	0.1197	0.1271	0.1334
7	-	-	0.0000	0.0240	0.0433	0.0593	0.0725	0.0837	0.0932	0.1013
8	-	-	-	-	0.0000	0.0196	0.0359	0.0496	0.0612	0.0711
9	-	-	-	-	-	-	0.0000	0.0163	0.0303	0.0422
10	-	-	-	-	-	-	-	-	0.0000	0.0140

i \ n	21	22	23	24	25	26	27	28	29	30
1	0.4643	0.4590	0.4542	0.4493	0.4450	0.4407	0.4366	0.4328	0.4291	0.4254
2	0.3185	0.3156	0.3126	0.3098	0.3069	0.3043	0.3018	0.2992	0.2968	0.2944
3	0.2578	0.2571	0.2563	0.2554	0.2543	0.2533	0.2522	0.2510	0.2499	0.2487
4	0.2119	0.2131	0.2139	0.2145	0.2148	0.2151	0.2152	0.2151	0.2150	0.2148
5	0.1736	0.1764	0.1787	0.1807	0.1822	0.1836	0.1848	0.1857	0.1864	0.1870
6	0.1399	0.1443	0.1480	0.1512	0.1539	0.1563	0.1584	0.1601	0.1616	0.1630
7	0.1092	0.1150	0.1201	0.1245	0.1283	0.1316	0.1346	0.1372	0.1395	0.1415
8	0.0804	0.0878	0.0941	0.0997	0.1046	0.1089	0.1128	0.1162	0.1192	0.1219
9	0.0530	0.0618	0.0696	0.0764	0.0823	0.0876	0.0923	0.0965	0.1002	0.1036
10	0.0263	0.0368	0.0459	0.0539	0.0610	0.0672	0.0728	0.0778	0.0822	0.0862
11	0.0000	0.0122	0.0228	0.0321	0.0403	0.0476	0.0540	0.0598	0.0650	0.0697
12	-	-	0.0000	0.0107	0.0200	0.0284	0.0358	0.0424	0.0483	0.0537
13	-	-	-	-	0.0000	0.0094	0.0178	0.0253	0.0320	0.0381
14	-	-	-	-	-	-	0.0000	0.0084	0.0159	0.0227
15	-	-	-	-	-	-	-	-	0.0000	0.0076

Source: From Shapiro and Wilk, 1965. Used by permission.
This table is used in Section 12.3.1.

i \ n	31	32	33	34	35	36	37	38	39	40
1	0.4220	0.4188	0.4156	0.4127	0.4096	0.4068	0.4040	0.4015	0.3989	0.3964
2	0.2921	0.2898	0.2876	0.2854	0.2834	0.2813	0.2794	0.2774	0.2755	0.2737
3	0.2475	0.2462	0.2451	0.2439	0.2427	0.2415	0.2403	0.2391	0.2380	0.2368
4	0.2145	0.2141	0.2137	0.2132	0.2127	0.2121	0.2116	0.2110	0.2104	0.2098
5	0.1874	0.1878	0.1880	0.1882	0.1883	0.1883	0.1883	0.1881	0.1880	0.1878
6	0.1641	0.1651	0.1660	0.1667	0.1673	0.1678	0.1683	0.1686	0.1689	0.1691
7	0.1433	0.1449	0.1463	0.1475	0.1487	0.1496	0.1505	0.1513	0.1520	0.1526
8	0.1243	0.1265	0.1284	0.1301	0.1317	0.1331	0.1344	0.1356	0.1366	0.1376
9	0.1066	0.1093	0.1116	0.1140	0.1160	0.1179	0.1196	0.1211	0.1225	0.1237
10	0.0899	0.0931	0.0961	0.0988	0.1013	0.1036	0.1056	0.1075	0.1092	0.1108
11	0.0739	0.0777	0.0812	0.0844	0.0873	0.0900	0.0924	0.0947	0.0967	0.0986
12	0.0585	0.0629	0.0669	0.0706	0.0739	0.0770	0.0798	0.0824	0.0848	0.0870
13	0.0435	0.0485	0.0530	0.0572	0.0610	0.0645	0.0677	0.0706	0.0733	0.0759
14	0.0289	0.0344	0.0395	0.0441	0.0484	0.0523	0.0559	0.0592	0.0622	0.0651
15	0.0144	0.0206	0.0262	0.0314	0.0361	0.0404	0.0444	0.0481	0.0515	0.0546
16	0.0000	0.0068	0.0131	0.0187	0.0239	0.0287	0.0331	0.0372	0.0409	0.0444
17	-	-	0.0000	0.0062	0.0119	0.0172	0.0220	0.0264	0.0305	0.0343
18	-	-	-	-	0.0000	0.0057	0.0110	0.0158	0.0203	0.0244
19	-	-	-	-	-	-	0.0000	0.0053	0.0101	0.0146
20	-	-	-	-	-	-	-	-	0.0000	0.0049

i \ n	41	42	43	44	45	46	47	48	49	50
1	0.3940	0.3917	0.3894	0.3872	0.3850	0.3830	0.3808	0.3789	0.3770	0.3751
2	0.2719	0.2701	0.2684	0.2667	0.2651	0.2635	0.2620	0.2604	0.2589	0.2574
3	0.2357	0.2345	0.2334	0.2323	0.2313	0.2302	0.2291	0.2281	0.2271	0.2260
4	0.2091	0.2085	0.2078	0.2072	0.2065	0.2058	0.2052	0.2045	0.2038	0.2032
5	0.1876	0.1874	0.1871	0.1868	0.1865	0.1862	0.1859	0.1855	0.1851	0.1847
6	0.1693	0.1694	0.1695	0.1695	0.1695	0.1695	0.1695	0.1693	0.1692	0.1691
7	0.1531	0.1535	0.1539	0.1542	0.1545	0.1548	0.1550	0.1551	0.1553	0.1554
8	0.1384	0.1392	0.1398	0.1405	0.1410	0.1415	0.1420	0.1423	0.1427	0.1430
9	0.1249	0.1259	0.1269	0.1278	0.1286	0.1293	0.1300	0.1306	0.1312	0.1317
10	0.1123	0.1136	0.1149	0.1160	0.1170	0.1180	0.1189	0.1197	0.1205	0.1212
11	0.1004	0.1020	0.1035	0.1049	0.1062	0.1073	0.1085	0.1095	0.1105	0.1113
12	0.0891	0.0909	0.0927	0.0943	0.0959	0.0972	0.0986	0.0998	0.1010	0.1020
13	0.0782	0.0804	0.0824	0.0842	0.0860	0.0876	0.0892	0.0906	0.0919	0.0932
14	0.0677	0.0701	0.0724	0.0745	0.0765	0.0783	0.0801	0.0817	0.0832	0.0846
15	0.0575	0.0602	0.0628	0.0651	0.0673	0.0694	0.0713	0.0731	0.0748	0.0764
16	0.0476	0.0506	0.0534	0.0560	0.0584	0.0607	0.0628	0.0648	0.0667	0.0685
17	0.0379	0.0411	0.0442	0.0471	0.0497	0.0522	0.0546	0.0568	0.0588	0.0608
18	0.0283	0.0318	0.0352	0.0383	0.0412	0.0439	0.0465	0.0489	0.0511	0.0532
19	0.0188	0.0227	0.0263	0.0296	0.0328	0.0357	0.0385	0.0411	0.0436	0.0459
20	0.0094	0.0136	0.0175	0.0211	0.0245	0.0277	0.0307	0.0335	0.0361	0.0386
21	0.0000	0.0045	0.0087	0.0126	0.0163	0.0197	0.0229	0.0259	0.0288	0.0314
22	-	-	0.0000	0.0042	0.0081	0.0118	0.0153	0.0185	0.0215	0.0244
23	-	-	-	-	0.0000	0.0039	0.0076	0.0111	0.0143	0.0174
24	-	-	-	-	-	-	0.0000	0.0037	0.0071	0.0104
25	-	-	-	-	-	-	-	-	0.0000	0.0035

Source: Gilbert (1987).

Note: The coefficients listed in the table are denoted as $a_{(n-i+1)}$ in Appendix F. For the value of n listed on the top of each column, the rows list the values of $a_{(n-i+1)}$, where $i = 1, \ldots, k$ and k is the largest integer less than or equal to $n/2$.

Table B-20.
Quantiles W_α of the Shapiro-Wilk W Test for Normality

n	$W_{0.01}$	$W_{0.02}$	$W_{0.05}$	$W_{0.10}$	$W_{0.50}$
3	0.753	0.756	0.767	0.789	0.959
4	0.687	0.707	0.748	0.792	0.935
5	0.686	0.715	0.762	0.806	0.927
6	0.713	0.743	0.788	0.826	0.927
7	0.730	0.760	0.803	0.838	0.928
8	0.749	0.778	0.818	0.851	0.932
9	0.764	0.791	0.829	0.859	0.935
10	0.781	0.806	0.842	0.869	0.938
11	0.792	0.817	0.850	0.876	0.940
12	0.805	0.828	0.859	0.883	0.943
13	0.814	0.837	0.866	0.889	0.945
14	0.825	0.846	0.874	0.895	0.947
15	0.835	0.855	0.881	0.901	0.950
16	0.844	0.863	0.887	0.906	0.952
17	0.851	0.869	0.892	0.910	0.954
18	0.858	0.874	0.897	0.914	0.956
19	0.863	0.879	0.901	0.917	0.957
20	0.868	0.884	0.905	0.920	0.959
21	0.873	0.888	0.908	0.923	0.960
22	0.878	0.892	0.911	0.926	0.961
23	0.881	0.895	0.914	0.928	0.962
24	0.884	0.898	0.916	0.930	0.963
25	0.886	0.901	0.918	0.931	0.964
26	0.891	0.904	0.920	0.933	0.965
27	0.894	0.906	0.923	0.935	0.965
28	0.896	0.908	0.924	0.936	0.966
29	0.898	0.910	0.926	0.937	0.966
30	0.900	0.912	0.927	0.939	0.967
31	0.902	0.914	0.929	0.940	0.967
32	0.904	0.915	0.930	0.941	0.968
33	0.906	0.917	0.931	0.942	0.968
34	0.908	0.919	0.933	0.943	0.969
35	0.910	0.920	0.934	0.944	0.969
36	0.912	0.922	0.935	0.945	0.970
37	0.914	0.924	0.936	0.946	0.970
38	0.916	0.925	0.938	0.947	0.971
39	0.917	0.927	0.939	0.948	0.971
40	0.919	0.928	0.940	0.949	0.972
41	0.920	0.929	0.941	0.950	0.972
42	0.922	0.930	0.942	0.951	0.972
43	0.923	0.932	0.943	0.951	0.973
44	0.924	0.933	0.944	0.952	0.973
45	0.926	0.934	0.945	0.953	0.973
46	0.927	0.935	0.945	0.953	0.974
47	0.928	0.936	0.946	0.954	0.974
48	0.929	0.937	0.947	0.954	0.974
49	0.929	0.937	0.947	0.955	0.974
50	0.930	0.938	0.947	0.955	0.974

Source: After Shapiro and Wilk, 1965.
The null hypothesis of a normal distribution is rejected at the α significance level if the calculated W is less than W_α.
This table is used in Section 12.3.1.

Source: Gilbert (1987).

Note: The assumption of normality is rejected at the $(1 - \alpha)100\%$ level of confidence when the calculated value of $W < W_\alpha$, where $P(W \leq W_\alpha) = \alpha$.

Table B-21.
Critical Values for the Studentized Range Test

	Level of Significance, α					
	0.01		0.05		0.1	
n	*a*	*b*	*a*	*b*	*a*	*b*
3	1.737	2.000	1.758	1.999	1.782	1.997
4	1.87	2.445	1.98	2.429	2.04	2.409
5	2.02	2.803	2.15	2.753	2.22	2.712
6	2.15	3.095	2.28	3.012	2.37	2.949
7	2.26	3.338	2.40	3.222	2.49	3.143
8	2.35	3.543	2.50	3.399	2.59	3.308
9	2.44	3.720	2.59	3.552	2.68	3.449
10	2.51	3.875	2.67	3.685	2.76	3.57
11	2.58	4.012	2.74	3.80	2.84	3.68
12	2.64	4.134	2.80	3.91	2.90	3.78
13	2.70	4.244	2.86	4.00	2.96	3.87
14	2.75	4.34	2.92	4.09	3.02	3.95
15	2.80	4.44	2.97	4.17	3.07	4.02
16	2.84	4.52	3.01	4.24	3.12	4.09
17	2.88	4.60	3.06	4.31	3.17	4.15
18	2.92	4.67	3.10	4.37	3.21	4.21
19	2.96	4.74	3.14	4.43	3.25	4.27
20	2.99	4.80	3.18	4.49	3.29	4.32
25	3.15	5.06	3.34	4.71	3.45	4.53
30	3.27	5.26	3.47	4.89	3.59	4.70
35	3.38	5.42	3.58	5.04	3.70	4.84
40	3.47	5.56	3.67	5.16	3.79	4.96
45	3.55	5.67	3.75	5.26	3.88	5.06
50	3.62	5.77	3.83	5.35	3.95	5.14
55	3.69	5.86	3.90	5.43	4.02	5.22
60	3.75	5.94	3.96	5.51	4.08	5.29
65	3.80	6.01	4.01	5.57	4.14	5.35
70	3.85	6.07	4.06	5.63	4.19	5.41
75	3.90	6.13	4.11	5.68	4.24	5.46
80	3.94	6.18	4.16	5.73	4.28	5.51
85	3.99	6.23	4.20	5.78	4.33	5.56
90	4.02	6.27	4.24	5.82	4.36	5.60
95	4.06	6.32	4.27	5.86	4.40	5.64
100	4.10	6.36	4.31	5.90	4.44	5.68
150	4.38	6.64	4.59	6.18	4.72	5.96
200	4.59	6.84	4.78	6.39	4.90	6.15
500	5.13	7.42	5.47	6.94	5.49	6.72
1000	5.57	7.80	5.79	7.33	5.92	7.11

Source: EPA/600/R-96/084.

Table B-22.
Percentage Points of the Studentized Range

$\alpha = 0.05$

ν \ k	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	17.97	26.98	32.82	37.08	40.41	43.12	45.40	47.36	49.07	50.59	51.96	53.20	54.33	55.36	56.32	57.22	58.04
2	6.085	8.331	9.798	10.88	11.74	12.44	13.03	13.54	13.99	14.39	14.75	15.08	15.38	15.65	15.91	16.14	16.37
3	4.501	5.910	6.825	7.502	8.037	8.478	8.853	9.177	9.462	9.717	9.946	10.15	10.35	10.53	10.69	10.84	10.98
4	3.927	5.040	5.757	6.287	6.707	7.053	7.347	7.602	7.826	8.027	8.208	8.373	8.525	8.664	8.794	8.914	9.028
5	3.635	4.602	5.218	5.673	6.033	6.330	6.582	6.802	6.995	7.168	7.324	7.466	7.596	7.717	7.828	7.932	8.030
6	3.461	4.339	4.896	5.305	5.628	5.895	6.122	6.319	6.493	6.649	6.789	6.917	7.034	7.143	7.244	7.338	7.426
7	3.344	4.165	4.681	5.060	5.359	5.606	5.815	5.998	6.158	6.302	6.431	6.550	6.658	6.759	6.852	6.939	7.020
8	3.261	4.041	4.529	4.886	5.167	5.399	5.597	5.767	5.918	6.054	6.175	6.287	6.389	6.483	6.571	6.653	6.729
9	3.199	3.949	4.415	4.756	5.024	5.244	5.432	5.595	5.739	5.867	5.983	6.089	6.186	6.276	6.359	6.437	6.510
10	3.151	3.877	4.327	4.654	4.912	5.124	5.305	5.461	5.599	5.722	5.833	5.935	6.028	6.114	6.194	6.269	6.339
11	3.113	3.820	4.256	4.574	4.823	5.028	5.202	5.353	5.487	5.605	5.713	5.811	5.901	5.984	6.062	6.134	6.202
12	3.082	3.773	4.199	4.508	4.751	4.950	5.119	5.265	5.395	5.511	5.615	5.710	5.798	5.878	5.953	6.023	6.089
13	3.055	3.735	4.151	4.453	4.690	4.885	5.049	5.192	5.318	5.431	5.533	5.625	5.711	5.789	5.862	5.931	5.995
14	3.033	3.702	4.111	4.407	4.639	4.829	4.990	5.131	5.254	5.364	5.463	5.554	5.637	5.714	5.786	5.852	5.915
15	3.014	3.674	4.076	4.367	4.595	4.782	4.940	5.077	5.198	5.306	5.404	5.493	5.574	5.649	5.720	5.785	5.846
16	2.998	3.649	4.046	4.333	4.557	4.741	4.897	5.031	5.150	5.256	5.352	5.439	5.520	5.593	5.662	5.727	5.786
17	2.984	3.628	4.020	4.303	4.524	4.705	4.858	4.991	5.108	5.212	5.307	5.392	5.471	5.544	5.612	5.675	5.734
18	2.971	3.609	3.997	4.277	4.495	4.673	4.824	4.956	5.071	5.174	5.267	5.352	5.429	5.501	5.568	5.630	5.688
19	2.960	3.593	3.977	4.253	4.469	4.645	4.794	4.924	5.038	5.140	5.231	5.315	5.391	5.462	5.528	5.589	5.647
20	2.950	3.578	3.958	4.232	4.445	4.620	4.768	4.896	5.008	5.108	5.199	5.282	5.357	5.427	5.493	5.553	5.610
24	2.919	3.532	3.901	4.166	4.373	4.541	4.684	4.807	4.915	5.012	5.099	5.179	5.251	5.319	5.381	5.439	5.494
30	2.888	3.486	3.845	4.102	4.302	4.464	4.602	4.720	4.824	4.917	5.001	5.077	5.147	5.211	5.271	5.327	5.379
40	2.858	3.442	3.791	4.039	4.232	4.389	4.521	4.635	4.735	4.824	4.904	4.977	5.044	5.106	5.163	5.216	5.266
60	2.829	3.399	3.737	3.977	4.163	4.314	4.441	4.550	4.646	4.732	4.808	4.878	4.942	5.001	5.056	5.107	5.154
120	2.800	3.356	3.685	3.917	4.096	4.241	4.363	4.468	4.560	4.641	4.714	4.781	4.842	4.898	4.950	4.998	5.044
∞	2.772	3.314	3.633	3.858	4.030	4.170	4.286	4.387	4.474	4.552	4.622	4.685	4.743	4.796	4.845	4.891	4.934

ν \ k	20	22	24	26	28	30	32	34	36	38	40	50	60	70	80	90
1	59.56	60.91	62.12	63.22	64.23	65.15	66.01	66.81	67.56	68.26	68.92	71 73	73.97	75.82	77.40	78.77
2	16.77	17.13	17.45	17.75	18.02	18.27	18.50	18.72	18.92	19.11	19.29	20.05	20.66	21.16	21.59	21.96
3	11.24	11.47	11.68	11.87	12.05	12.21	12.36	12.50	12.63	12.75	12.87	13.36	13.76	14.08	14.36	14.61
4	9.233	9.418	9.584	9.736	9.875	10.00	10.12	10.23	10.34	10.44	10.53	10.93	11.24	11.51	11.73	11.92
5	8.208	8.368	8.512	8.643	8.764	8.875	8.979	9.075	9.165	9.250	9.330	9.674	9.949	10.18	10.38	10.54
6	7.587	7.730	7.861	7.979	8.088	8.189	8.283	8.370	8.452	8.529	8.601	8.913	9.163	9.370	9.548	9.702
7	7.170	7.303	7.423	7.533	7.634	7.728	7.814	7.895	7.972	8.043	8.110	8.400	8.632	8.824	8.989	9.133
8	6.870	6.995	7.109	7.212	7.307	7.395	7.477	7.554	7.625	7.693	7.756	8.029	8.248	8.430	8.586	8.722
9	6.644	6.763	6.871	6.970	7.061	7.145	7.222	7.295	7.363	7.428	7.488	7.749	7.958	8.132	8.281	8.410
10	6.467	6.582	6.686	6.781	6.868	6.948	7.023	7.093	7.159	7.220	7.279	7.529	7.730	7.897	8.041	8.166
11	6.326	6.436	6.536	6.628	6.712	6.790	6.863	6.930	6.994	7.053	7.110	7.352	7.546	7.708	7.847	7.968
12	6.209	6.317	6.414	6.503	6.585	6.660	6.731	6.796	6.858	6.916	6.970	7.205	7.394	7.552	7.687	7.804
13	6.112	6.217	6.312	6.398	6.478	6.551	6.620	6.684	6.744	6.800	6.854	7.083	7.267	7.421	7.552	7.667
14	6.029	6.132	6.224	6.309	6.387	6.459	6.526	6.588	6.647	6.702	6.754	6.979	7.159	7.309	7.438	7.550
15	5.958	6.059	6.149	6.233	6.309	6.379	6.445	6.506	6.564	6.618	6.669	6.888	7.065	7.212	7.339	7.449
16	5.897	5.995	6.084	6.166	6.241	6.310	6.374	6.434	6.491	6.544	6.594	6.810	6.984	7.128	7.252	7.360
17	5.842	5.940	6.027	6.107	6.181	6.249	6.312	6.372	6.427	6.479	6.529	6.741	6.912	7.054	7.176	7.283
18	5.794	5.890	5.977	6.055	6.128	6.195	6.258	6.316	6.371	6.422	6.471	6.680	6.848	6.989	7.109	7.213
19	5.752	5.846	5.932	6.009	6.081	6.147	6.209	6.267	6.321	6.371	6.419	6.628	6.792	6.930	7.048	7.152
20	5.714	5.807	5.891	5.968	6.039	6.104	6.165	6.222	6.275	6.325	6.373	6.576	6.740	6.877	6.994	7.097
24	5.594	5.683	5.764	5.838	5.906	5.968	6.027	6.081	6.132	6.181	6.226	6.421	6.579	6.710	6.822	6.920
30	5.475	5.561	5.638	5.709	5.774	5.833	5.889	5.941	5.990	6.037	6.080	6.267	6.417	6.543	6.650	6.744
40	5.358	5.439	5.513	5.581	5.642	5.700	5.753	5.803	5.849	5.893	5.934	6.112	6.255	6.375	6.477	6.566
60	5.241	5.319	5.389	5.453	5.512	5.566	5.617	5.664	5.708	5.750	5.789	5.958	6.093	6.206	6.303	6.387
120	5.126	5.200	5.266	5.327	5.382	5.434	5.481	5.526	5.568	5.607	5.644	5.802	5.929	6.035	6.126	6.205
∞	5.012	5.081	5.144	5.201	5.253	5.301	5.346	5.388	5.427	5.463	5.498	5.646	5.764	5.863	5.947	6.020

$\alpha = 0.01$

k	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	90.03	135.0	164.3	185.6	202.2	215.8	227.2	237.0	245.6	253.2	260.0	266.2	271.8	277.0	281.8	286.3	290.4
2	14.04	19.02	22.29	24.72	26.63	28.20	29.53	30.68	31.69	32.59	33.40	34.13	34.81	35.43	36.00	36.53	37.03
3	8.261	10.62	12.17	13.33	14.24	15.00	15.64	16.20	16.69	17.13	17.53	17.89	18.22	18.52	18.81	19.07	19.32
4	6.512	8.120	9.173	9.958	10.58	11.10	11.55	11.93	12.27	12.57	12.84	13.09	13.32	13.53	13.73	13.91	14.08
5	5.702	6.976	7.804	8.421	8.913	9.321	9.669	9.972	10.24	10.48	10.70	10.89	11.08	11.24	11.40	11.55	11.68
6	5.243	6.331	7.033	7.556	7.973	8.318	8.613	8.869	9.097	9.301	9.485	9.653	9.808	9.951	10.08	10.21	10.32
7	4.949	5.919	6.543	7.005	7.373	7.679	7.939	8.166	8.368	8.548	8.711	8.860	8.997	9.124	9.242	9.353	9.456
8	4.746	5.635	6.204	6.625	6.960	7.237	7.474	7.681	7.863	8.027	8.176	8 312	8.436	8.552	8.659	8.760	8.854
9	4.596	5.428	5.957	6.348	6.658	6.915	7.134	7.325	7.495	7.647	7.784	7.910	8.025	8.132	8.232	8.325	8.412
10	4.482	5.270	5.769	6.136	6.428	6.669	6.875	7.055	7.213	7.356	7.485	7.603	7.712	7.812	7.906	7.993	8.076
11	4.392	5.146	5.621	5.970	6.247	6.476	6.672	6.842	6.992	7.128	7 250	7.362	7.465	7.560	7.649	7.732	7.809
12	4.320	5.046	5.502	5.836	6.101	6.321	6.507	6.670	6.814	6.943	7.060	7.167	7.265	7.356	7.441	7.520	7.594
13	4.260	4.964	5.404	5.727	5.981	6.192	6.372	6.528	6.667	6.791	6.903	7.006	7.101	7.188	7.269	7 345	7.417
14	4.210	4.895	5.322	5.634	5.881	6.085	6.258	6.409	6.543	6.664	6.772	6.871	6.962	7.047	7.126	7.199	7.268
15	4.168	4.836	5.252	5.556	5.796	5.994	6.162	6.309	6.439	6.555	6 660	6.757	6.845	6.927	7.003	7.074	7.142
16	4.131	4.786	5.192	5.489	5.722	5.915	6.079	6.222	6.349	6.462	6.564	6.658	6.744	6.823	6.898	6.967	7.032
17	4.099	4.742	5.140	5.430	5.659	5.847	6.007	6.147	6.270	6.381	6.480	6.572	6.656	6.734	6.806	6.873	6.937
18	4.071	4.703	5.094	5.379	5.603	5.788	5.944	6.081	6.201	6.310	6.407	6.497	6.579	6.655	6.725	6.792	6.854
19	4.046	4.670	5.054	5.334	5.554	5.735	5.889	6.022	6.141	6.247	6.342	6.430	6.510	6.585	6.654	6.719	6.780
20	4.024	4.639	5.018	5.294	5.510	5.688	5.839	5.970	6.087	6.191	6.285	6.371	6.450	6.523	6.591	6.654	6.714
24	3.956	4.546	4.907	5.168	5.374	5.542	5.685	5.809	5.919	6.017	6.106	6.186	6.261	6.330	6.394	6.453	6.510
30	3.889	4.455	4.799	5.048	5.242	5.401	5.536	5.653	5.756	5.849	5.932	6.008	6.078	6.143	6.203	6.259	6.311
40	3.825	4.367	4.696	4.931	5.114	5.265	5.392	5.502	5.599	5.686	5.764	5.835	5.900	5.961	6.017	6.069	6.119
60	3.762	4.282	4.595	4.818	4.991	5.133	5.253	5.356	5.447	5.528	5.601	5.667	5.728	5.785	5.837	5.886	5.931
120	3.702	4.200	4.497	4.709	4.872	5.005	5.118	5.214	5.299	5.375	5.443	5.505	5.562	5 614	5.662	5.708	5.750
∞	3.643	4.120	4.403	4.603	4.757	4.882	4.987	5.078	5.157	5.227	5.290	5.348	5.400	5.448	5.493	5.535	5.574

ν \ k	20	22	24	26	28	30	32	34	36	38	40	50	60	70	80	90
1	298.0	304.7	310.8	316.3	321.3	326.0	330.3	334.3	338.0	341.5	344 8	358.9	370.1	379 4	387.3	394.1
2	37.95	38.76	39.49	40.15	40.76	41.32	41.84	42.33	42.78	43.21	43.61	45.33	46.70	47.83	48.80	49.64
3	19.77	20.17	20.53	20.86	21.16	21.44	21.70	21.95	22.17	22.39	22.59	23.45	24 13	24.71	25.19	25.62
4	14.40	14.68	14.93	15.16	15.37	15.57	15.75	15.92	16.08	16.23	16.37	16.98	17.46	17.86	18.20	18.50
5	11.93	12.16	12.36	12.54	12.71	12.87	13.02	13.15	13.28	13.40	13.52	14.00	14.39	14.72	14.99	15.23
6	10.54	10.73	10.91	11.06	11.21	11.34	11.47	11.58	11.69	11.80	11.90	12.31	12.65	12.92	13.16	13.37
7	9.646	9.815	9.970	10.11	10.24	10.36	10.47	10.58	10.67	10.77	10.85	11.23	11.52	11.77	11.99	12.17
8	9.027	9.182	9.322	9.450	9.569	9.678	9.779	9.874	9.964	10.05	10.13	10.47	10.75	10.97	11.17	11.34
9	8.573	8.717	8.847	8.966	9.075	9.177	9.271	9.360	9.443	9.521	9.594	9.912	10.17	10.38	10.57	10.73
10	8.226	8.361	8.483	8.595	8.698	8.794	8.883	8.966	9.044	9.117	9.187	9.486	9.726	9.927	10.10	10.25
11	7.952	8.080	8.196	8.303	8.400	8.491	8.575	8.654	8.728	8.798	8.864	9.148	9.377	9.568	9.732	9.875
12	7.731	7.853	7.964	8.066	8.159	8.246	8.327	8.402	8.473	8.539	8.603	8.875	9.094	9.277	9.434	9.571
13	7.548	7.665	7.772	7.870	7.960	8.043	8.121	8.193	8.262	8.326	8.387	8.648	8.859	9.035	9.187	9.318
14	7.395	7.508	7.611	7.705	7.792	7.873	7.948	8.018	8.084	8.146	8.204	8.457	8.661	8.832	8.978	9.106
15	7.264	7.374	7.474	7.566	7.650	7.728	7.800	7.869	7.932	7.992	8.049	8.296	8.492	8.658	8.800	8.924
16	7.152	7.258	7.356	7.445	7.527	7.602	7.673	7.739	7.802	7.860	7 916	8.154	8.347	8.507	8.646	8.767
17	7.053	7.158	7.253	7.340	7.420	7.493	7.563	7.627	7.687	7 745	7.799	8.031	8.219	8.377	8.511	8.630
18	6.968	7.070	7.169	7.247	7.325	7.398	7.465	7.528	7.587	7.643	7.696	7.924	8 107	8.261	8.393	8.508
19	6.891	6.992	7.082	7.166	7.242	7.313	7.379	7.440	7.498	7.553	7.605	7.828	8.008	8.159	8.288	8.401
20	6.823	6.922	7.011	7.092	7.168	7.237	7.302	7.362	7.419	7.473	7.523	7.742	7.919	8.067	8.194	8.305
24	6.612	6.705	6.789	6.865	6.936	7.001	7.062	7.119	7.173	7.223	7.270	7.476	7.642	7.780	7.900	8.004
30	6.407	6.494	6.572	6.644	6.710	6.772	6.828	6.881	6.932	6.978	7 023	7.215	7.370	7.500	7.611	7.709
40	6.209	6.289	6.362	6.429	6.490	6.547	6.600	6.650	6.697	6.740	6.782	6.960	7.104	7.225	7.328	7.419
60	6.015	6.090	6.158	6.220	6.277	6.330	6.378	6.424	6.467	6.507	6.546	6.710	6.843	6.954	7.050	7.133
120	5.827	5.897	5.959	6.016	6.069	6.117	6.162	6.204	6.244	6.281	6.316	6.467	6.588	6.689	6.776	6.852
∞	5.645	5.709	5.766	5.818	5.866	5.911	5.952	5.990	6.026	6.060	6.092	6.228	6.338	6.429	6.507	6.575

ource: Adapted from Harter, H. L. (1960). "Tables of Range and Studentized Range," *Annals of Mathematical Statistics*, **31**, 1122–1147. Used by permission of th
f Mathematical Statistics.

Source: Mason et al. (1989).

Table B-23.
Critical Values of Student's *t*-Distribution

p								
df	**0.8**	**0.9**	**0.95**	**0.975**	**0.99**	**0.995**	**0.999**	**0.9995**
1	1.376	3.078	6.314	12.71	31.82	63.66	318.3	636.6
2	1.061	1.886	2.920	4.303	6.965	9.925	22.33	31.60
3	0.9785	1.638	2.353	3.182	4.541	5.841	10.21	12.92
4	0.9410	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.9195	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.9057	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.8960	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.8889	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.8834	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.8791	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.8755	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.8726	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.8702	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.8681	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.8662	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.8647	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.8633	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.8620	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.8610	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.8600	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.8591	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.8583	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.8575	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.8569	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.8562	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.8557	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.8551	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.8546	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.8542	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.8538	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.8507	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.8477	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	0.8446	1.289	1.658	1.980	2.358	2.617	3.160	3.373
	0.8417	1.282	1.645	1.960	2.327	2.576	3.091	3.291

NOTE: Table generated using SAS, a statistical software package. The percentiles $t_{p,\nu}$ are listed for various values of degrees of freedom (df), ν: $p = P(t_\nu \le t_{p,\nu})$.

Table B-24.
Quantiles of the Wilcoxon Signed Rank Test

n	$w_{0.01}$	$w_{0.05}$	$w_{0.10}$	$w_{0.20}$
4	0	0	1	3
5	0	1	3	4
6	0	3	4	6
7	1	4	6	9
8	2	6	9	12
9	4	9	11	15
10	6	11	15	19
11	8	14	18	23
12	10	18	22	28
13	13	22	27	33
14	16	26	32	39
15	20	31	37	45
16	24	36	43	51
17	28	42	49	58
18	33	48	56	66
19	38	54	63	74
20	44	61	70	82

Source: EPA/600/R-96/084.

Table B-25.
Modified Quantile Test Critical Numbers Level of Significance (α)

For Approximately $\alpha = 0.10$

	n = number of measurements population 1																
m = number of measurements population 2		5	6	7	8	90	10	11	12	13	14	15	16	17	18	19	20
	5	3	3	4	4	5	5	5	6	6	7	7	7	8	8	8	8
	6	3	3	3	4	4	4	4	5	5	6	6	7	7	8	8	8
	7	2	2	3	3	4	4	4	4	5	5	6	6	6	7	7	7
	8	2	2	3	3	3	4	4	4	4	5	5	5	5	6	6	6
	9	2	2	3	3	3	3	4	4	4	4	5	5	5	5	5	6
	10	2	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5
	11	2	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5
	12	2	2	2	2	2	2	3	3	3	3	4	4	4	4	5	5
	13	2	2	2	2	2	2	2	3	3	3	3	4	4	4	4	4
	14	2	2	2	2	2	2	2	2	3	3	3	3	4	4	4	4
	15	2	2	2	2	2	2	2	2	2	3	3	3	3	4	4	4
	16	2	2	2	2	2	2	2	2	2	2	3	3	3	3	4	4
	17	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3
	18	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
	19	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
	20	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3

For Approximately $\alpha = 0.10$

	n = number of measurements population 1																
m = number of measurements population 2		25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	25	3	4	4	5	5	5	6	6	7	7	8	8	8	9	9	10
	30	3	3	4	4	5	5	5	6	6	6	7	7	7	8	8	8
	35	3	3	3	4	4	4	5	5	5	6	6	6	6	7	7	7
	40	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7
	45	3	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6
	50	2	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6
	55	2	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5
	60	2	2	3	3	3	3	3	4	4	4	4	4	4	5	5	5
	65	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5
	70	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4
	75	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4
	80	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4
	85	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4
	90	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4	4
	95	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	4
	100	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	4

For Approximately $\alpha = 0.05$

m = number of measurements population 2	n = number of measurements population 1																
	5	6	7	8	90	10	11	12	13	14	15	16	17	18	19	20
5	4	4	5	5	6	6	6	7	7	8	8	8	9	9	10	10
6	4	4	4	5	5	5	5	6	6	7	7	8	8	9	9	9
7	3	4	4	4	5	5	5	5	6	6	7	7	7	8	8	8
8	3	3	4	4	4	5	5	5	5	6	6	6	6	7	7	7
9	3	3	3	4	4	4	5	5	5	5	6	6	6	6	6	6
10	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6
11	3	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6
12	3	3	3	3	3	3	4	4	4	4	5	5	5	5	6	6
13	3	3	3	3	3	3	3	4	4	4	4	5	5	5	5	5
14	2	3	3	3	3	3	3	3	4	4	4	4	5	5	5	5
15	2	2	3	3	3	3	3	3	3	4	4	4	4	5	5	5
16	2	2	2	3	3	3	3	3	3	3	4	4	4	4	5	5
17	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4	4
18	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4
19	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4
20	2	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4

For Approximately $\alpha = 0.05$

	n = number of measurements population 1																
m = number of measurements population 2		**25**	30	**35**	40	45	50	**55**	60	**65**	70	**75**	80	85	90	95	100
	25	4	4	**5**	6	**7**	**7**	8	8	8	9	9	**10**	**10**	**11**	**11**	**12**
	30	4	4	**5**	**5**	6	6	**7**	**7**	8	8	9	**9**	9	**10**	**10**	**11**
	35	**3**	4	4	**5**	**5**	6	6	6	**7**	**7**	8	8	8	9	9	**10**
	40	**3**	4	4	4	**5**	**5**	**5**	6	6	**7**	**7**	**7**	8	8	8	9
	45	**3**	4	4	4	4	**5**	**5**	**5**	6	6	6	**7**	**7**	**7**	8	8
	50	**3**	**3**	4	4	4	4	**5**	**5**	**5**	**5**	6	6	6	**7**	**7**	**7**
	55	**3**	**3**	**3**	4	4	4	4	**5**	**5**	**5**	**5**	6	6	6	6	**7**
	60	**3**	**3**	**3**	**3**	4	4	4	4	**5**	**5**	**5**	**5**	6	6	6	6
	65	**2**	**3**	**3**	**3**	**3**	4	4	4	4	**5**	**5**	**5**	**5**	**5**	6	6
	70	**2**	**3**	**3**	**3**	**3**	**3**	4	4	4	4	**5**	**5**	**5**	**5**	**5**	6
	75	**2**	**3**	**3**	**3**	**3**	**3**	**3**	4	4	4	**5**	**5**	**5**	**5**	**5**	**5**
	80	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	4	4	4	**5**	**5**	**5**	**5**	**5**
	85	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	4	4	4	**5**	**5**	**5**	**5**
	90	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	4	4	4	**5**	**5**	**5**
	95	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	4	4	4	**5**	**5**
	100	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	4	4	4	**5**

Source: EPA/600/R-96/084.

Table B-26.
Dunnett's Test (One-Tailed) Total Number of Investigate Groups (*K* - 1)

Degrees of Freedom	α	2	3	4	5	6	7	8	9	10	12	14	16
2	.05	3.80	4.34	4.71	5.08	5.24	5.43	5.60	5.75	5.88	6.11	6.29	[illegible]
	.10	2.54	2.92	3.20	3.40	3.57	3.71	3.83	3.94	4.03	4.19	4.32	[illegible]
3	.05	2.94	3.28	3.52	3.70	3.85	3.97	4.08	4.17	4.25	4.39	4.51	4.61
	.10	2.13	2.41	2.61	2.76	2.87	2.97	3.06	3.13	3.20	3.31	3.41	3.49
4	.05	2.61	2.88	3.08	3.22	3.34	3.44	3.52	3.59	3.66	3.77	3.86	3.94
	.10	1.96	2.20	2.37	2.50	2.60	2.68	2.75	2.82	2.87	2.97	3.05	3.11
5	.05	2.44	2.68	2.85	2.98	3.08	3.16	3.24	3.30	3.36	3.45	3.53	3.60
	.10	1.87	2.09	2.24	2.36	2.45	2.53	2.59	2.65	2.70	2.78	2.86	2.92
6	.05	2.34	2.56	2.71	2.83	2.92	3.00	3.06	3.12	3.17	3.26	3.33	3.40
	.10	1.82	2.02	2.17	2.27	2.36	2.43	2.49	2.54	2.59	2.67	2.74	2.79
7	.05	2.27	2.48	2.62	2.73	2.81	2.89	2.95	3.00	3.05	3.13	3.20	3.26
	.10	1.78	1.98	2.11	2.22	2.30	2.37	2.42	2.47	2.52	2.59	2.65	2.71
8	.05	2.22	2.42	2.55	2.66	2.74	2.81	2.87	2.92	2.96	3.04	3.11	3.16
	.10	1.75	1.94	2.08	2.17	2.25	2.32	2.38	2.42	2.47	2.54	2.60	2.65
9	.05	2.18	2.37	2.50	2.60	2.68	2.75	2.81	2.86	2.90	2.97	3.04	3.09
	.10	1.73	1.92	2.05	2.14	2.22	2.28	2.34	2.39	2.43	2.50	2.56	2.61
10	.05	2.15	2.34	2.47	2.56	2.64	2.70	2.76	2.81	2.85	2.92	2.98	3.03
	.10	1.71	1.90	2.02	2.12	2.19	2.26	2.31	2.35	2.40	2.46	2.52	2.57
12	.05	2.11	2.29	2.41	2.50	2.58	2.64	2.69	2.74	2.78	2.84	2.90	2.95
	.10	1.69	1.87	1.99	2.08	2.16	2.22	2.27	2.31	2.35	2.42	2.47	2.52
16	.05	2.06	2.23	2.34	2.43	2.50	2.56	2.61	2.65	2.69	2.75	2.81	2.85
	.10	1.66	1.83	1.95	2.04	2.11	2.17	2.22	2.26	2.30	2.36	2.41	2.45
20	.05	2.03	2.19	2.30	2.39	2.46	2.51	2.56	2.60	2.64	2.70	2.75	2.80
	.10	1.64	1.81	1.93	2.01	2.08	2.14	2.19	2.23	2.26	2.33	2.38	2.42
24	.05	2.01	2.17	2.28	2.36	2.43	2.48	2.53	2.57	2.60	2.66	2.72	2.76
	.10	1.63	1.80	1.91	2.00	2.06	2.12	2.17	2.21	2.24	2.30	2.35	2.40
30	.05	1.99	2.15	2.25	2.34	2.40	2.45	2.50	2.54	2.57	2.63	2.68	2.72
	.10	1.62	1.79	1.90	1.98	2.05	2.10	2.15	2.19	2.22	2.28	2.33	2.37
40	.05	1.97	2.13	2.23	2.31	2.37	2.42	2.47	2.51	2.54	2.60	2.65	2.69
	.10	1.61	1.77	1.88	1.96	2.03	2.08	2.13	2.17	2.20	2.26	2.31	2.35
50	.05	1.96	2.11	2.22	2.29	2.32	2.41	2.45	2.49	2.52	2.58	2.63	2.67
	.10	1.61	1.77	1.88	1.95	2.02	2.07	2.12	2.16	2.19	2.25	2.30	2.34
60	.05	1.95	2.10	2.21	2.28	2.34	2.40	2.44	2.48	2.51	2.57	2.61	2.65
	.10	1.60	1.76	1.87	1.95	2.01	2.06	2.11	2.15	2.18	2.24	2.29	2.33
70	.05	1.95	2.10	2.21	2.28	2.34	2.40	2.44	2.48	2.51	2.56	2.61	2.65
	.10	1.60	1.76	1.87	1.95	2.01	2.06	2.11	2.15	2.18	2.24	2.29	2.33
80	.05	1.94	2.10	2.20	2.28	2.34	2.39	2.43	2.47	2.50	2.55	2.60	2.64
	.10	1.60	1.76	1.87	1.95	2.01	2.06	2.10	2.15	2.18	2.23	2.28	2.32
90	.05	1.94	2.09	2.20	2.27	2.33	2.39	2.43	2.47	2.50	2.55	2.60	2.63
	.10	1.60	1.76	1.86	1.94	2.00	2.06	2.10	2.14	2.17	2.23	2.28	2.31
100	.05	1.93	2.08	2.18	2.27	2.33	2.38	2.42	2.46	2.49	2.54	2.59	2.63
	.10	1.59	1.75	1.85	1.93	1.99	2.05	2.09	2.14	2.17	2.22	2.27	2.31
120	.05	1.93	2.08	2.18	2.26	2.32	2.37	2.41	2.45	2.48	2.53	2.58	2.62
	.10	1.59	1.75	1.85	1.93	1.99	2.05	2.09	2.13	2.16	2.22	2.27	2.31
	.05	1.92	2.06	2.16	2.23	2.29	2.34	2.38	2.42	2.45	2.50	2.55	2.58
	.10	1.58	1.73	1.84	1.92	1.98	2.03	2.07	2.11	2.14	2.20	2.24	2.28

Source: EPA/600/R-96/084.

Table B-27.
Upper Tail Critical Values for the *F*-Max Test

		Critical Value									
ν	α	$k=3$	4	5	6	7	8	9	10	11	12
2	.10	42.48	69.13	98.18	129.1	161.7	195.6	230.7	266.8	303.9	341.9
	.05	87.49	142.5	202.4	266.2	333.2	403.1	475.4	549.8	626.2	704.4
	.01	447.5	729.2	1036	1362	1705	2063	2432	2813	3204	3604
3	.10	16.77	23.95	30.92	37.73	44.40	50.94	57.38	63.72	69.97	76.14
	.05	27.76	39.51	50.88	61.98	72.83	83.48	93.94	104.2	114.4	124.4
	.01	84.56	119.8	153.8	187.0	219.3	251.1	282.3	313.0	343.2	373.1
4	.10	10.38	13.88	17.08	20.06	22.88	25.57	28.14	30.62	33.01	35.33
	.05	15.46	20.56	25.21	29.54	33.63	37.52	41.24	44.81	48.27	51.61
	.01	36.70	48.43	59.09	69.00	78.33	87.20	95.68	103.8	111.7	119.3
5	.10	7.68	9.86	11.79	13.54	15.15	16.66	18.08	19.43	20.71	21.95
	.05	10.75	13.72	16.34	18.70	20.88	22.91	24.83	26.65	28.38	30.03
	.01	22.06	27.90	33.00	37.61	41.85	45.81	49.53	53.06	56.42	59.63
6	.10	6.23	7.78	9.11	10.30	11.38	12.38	13.31	14.18	15.01	15.79
	.05	8.36	10.38	12.11	13.64	15.04	16.32	17.51	18.64	19.70	20.70
	.01	15.60	19.16	22.19	24.89	27.32	29.57	31.65	33.61	35.46	37.22
7	.10	5.32	6.52	7.52	8.41	9.20	9.93	10.60	11.23	11.82	12.37
	.05	6.94	8.44	9.70	10.80	11.80	12.70	13.54	14.31	15.05	15.74
	.01	12.09	14.55	16.60	18.39	20.00	21.47	22.82	24.08	25.26	26.37
8	.10	4.71	5.68	6.48	7.18	7.80	8.36	8.88	9.36	9.81	10.23
	.05	6.00	7.19	8.17	9.02	9.77	10.46	11.08	11.67	12.21	12.72
	.01	9.94	11.77	13.27	14.58	15.73	16.78	17.74	18.63	19.46	20.24
9	.10	4.26	5.07	5.74	6.31	6.82	7.28	7.70	8.09	8.45	8.78
	.05	5.34	6.31	7.11	7.79	8.40	8.94	9.44	9.90	10.33	10.73
	.01	8.49	9.93	11.10	12.11	12.99	13.79	14.52	15.19	15.81	16.39
10	.10	3.93	4.63	5.19	5.68	6.11	6.49	6.84	7.16	7.46	7.74
	.05	4.85	5.67	6.34	6.91	7.41	7.86	8.27	8.64	8.99	9.32
	.01	7.46	8.64	9.59	10.39	11.10	11.74	12.31	12.84	13.33	13.79
12	.10	3.45	4.00	4.44	4.81	5.13	5.42	5.68	5.92	6.14	6.35
	.05	4.16	4.79	5.30	5.72	6.09	6.42	6.72	6.99	7.24	7.48
	.01	6.10	6.95	7.63	8.20	8.69	9.13	9.53	9.89	10.23	10.54
15	.10	3.00	3.41	3.74	4.02	4.25	4.46	4.65	4.82	4.98	5.13
	.05	3.53	4.00	4.37	4.67	4.94	5.17	5.38	5.57	5.75	5.91
	.01	4.93	5.52	5.99	6.37	6.71	7.00	7.27	7.51	7.73	7.93
20	.10	2.57	2.87	3.10	3.29	3.46	3.60	3.73	3.85	3.96	4.06
	.05	2.95	3.28	3.53	3.74	3.92	4.08	4.22	4.35	4.46	4.57
	.01	3.90	4.29	4.60	4.85	5.06	5.25	5.42	5.57	5.70	5.83
30	.10	2.14	2.34	2.50	2.62	2.73	2.82	2.90	2.97	3.04	3.10
	.05	2.40	2.61	2.77	2.90	3.01	3.11	3.19	3.27	3.34	3.40
	.01	2.99	3.23	3.41	3.56	3.68	3.79	3.88	3.97	4.04	4.12
60	.10	1.71	1.82	1.90	1.96	2.02	2.07	2.11	2.14	2.18	2.21
	.05	1.84	1.96	2.04	2.11	2.16	2.21	2.25	2.29	2.32	2.35
	.01	2.15	2.26	2.35	2.42	2.47	2.52	2.57	2.61	2.64	2.67

Source: Nelson, L. (1987). "Upper 10%, 5%, and 1% Points of the Maximum *F*-Ratio," *Journal of Quality Technology*, 19, 165–67. Copyright American Society for Quality Control, Inc., Milwaukee, WI. Reprinted by permission.

Source: Mason et al. (1989).

Table B-28.

Power of ANOVA for K = 3 groups and Significance Level, 0.05

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.052	0.058	0.068	0.082	0.125	0.185	0.260	0.349
3	0.054	0.068	0.091	0.126	0.232	0.380	0.551	0.712
4	0.056	0.078	0.116	0.173	0.343	0.559	0.761	0.898
5	0.059	0.088	0.141	0.221	0.449	0.701	0.883	0.968
6	0.061	0.099	0.167	0.269	0.545	0.805	0.946	0.991
7	0.064	0.110	0.194	0.318	0.631	0.877	0.976	0.997
8	0.066	0.121	0.221	0.365	0.704	0.924	0.990	0.999
9	0.069	0.132	0.248	0.412	0.766	0.954	0.996	0.999
10	0.071	0.143	0.275	0.457	0.817	0.973	0.998	0.999
12	0.076	0.166	0.329	0.542	0.891	0.991	0.999	0.999
14	0.081	0.189	0.382	0.619	0.937	0.997	0.999	0.999
16	0.086	0.213	0.434	0.686	0.965	0.999	0.999	0.999
18	0.092	0.237	0.484	0.744	0.980	0.999	0.999	1.000
20	0.097	0.261	0.531	0.793	0.989	0.999	0.999	1.000
25	0.110	0.321	0.638	0.882	0.998	0.999	0.999	1.000
30	0.124	0.380	0.726	0.936	0.999	0.999	1.000	1.000
35	0.138	0.437	0.796	0.966	0.999	0.999	1.000	1.000
40	0.152	0.492	0.851	0.982	0.999	1.000	1.000	1.000
50	0.181	0.593	0.923	0.995	0.999	1.000	1.000	1.000

Power of ANOVA for K = 3 groups and Significance Level, 0.1

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.103	0.114	0.132	0.158	0.229	0.323	0.432	0.547
3	0.107	0.130	0.168	0.221	0.369	0.547	0.719	0.852
4	0.111	0.145	0.203	0.283	0.492	0.711	0.873	0.958
5	0.115	0.160	0.237	0.341	0.598	0.822	0.946	0.989
6	0.118	0.175	0.270	0.398	0.686	0.894	0.978	0.997
7	0.122	0.190	0.303	0.452	0.758	0.938	0.991	0.999
8	0.126	0.205	0.336	0.502	0.815	0.964	0.996	0.999
9	0.129	0.220	0.368	0.550	0.861	0.980	0.998	0.999
10	0.133	0.235	0.399	0.594	0.896	0.989	0.999	0.999
12	0.140	0.264	0.459	0.673	0.943	0.996	0.999	0.999
14	0.148	0.294	0.515	0.739	0.969	0.999	0.999	0.999
16	0.155	0.323	0.567	0.794	0.984	0.999	0.999	0.999
18	0.162	0.351	0.615	0.839	0.992	0.999	0.999	1.000
20	0.170	0.379	0.659	0.875	0.996	0.999	0.999	1.000
25	0.188	0.446	0.752	0.935	0.999	0.999	1.000	1.000
30	0.207	0.509	0.823	0.967	0.999	0.999	1.000	1.000
35	0.225	0.567	0.875	0.984	0.999	0.999	1.000	1.000
40	0.244	0.620	0.914	0.992	0.999	1.000	1.000	1.000
50	0.281	0.711	0.960	0.998	0.999	1.000	1.000	1.000

Power of ANOVA for K = 3 groups and Significance Level, 0.2

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.206	0.224	0.254	0.294	0.399	0.525	0.652	0.765
3	0.211	0.245	0.301	0.373	0.551	0.729	0.864	0.945
4	0.216	0.266	0.344	0.443	0.665	0.847	0.949	0.987
5	0.221	0.285	0.384	0.506	0.753	0.916	0.981	0.997
6	0.226	0.304	0.423	0.563	0.819	0.954	0.993	0.999
7	0.231	0.323	0.459	0.614	0.869	0.976	0.997	0.999
8	0.236	0.341	0.494	0.661	0.906	0.987	0.999	0.999
9	0.241	0.359	0.527	0.702	0.933	0.993	0.999	0.999
10	0.246	0.377	0.558	0.739	0.952	0.996	0.999	0.999
12	0.256	0.411	0.616	0.801	0.976	0.999	0.999	0.999
14	0.266	0.444	0.667	0.850	0.988	0.999	0.999	0.999
16	0.275	0.475	0.712	0.887	0.994	0.999	0.999	1.000
18	0.285	0.505	0.752	0.916	0.997	0.999	0.999	1.000
20	0.294	0.534	0.787	0.938	0.998	0.999	0.999	1.000
25	0.317	0.600	0.856	0.971	0.999	0.999	1.000	1.000
30	0.340	0.659	0.904	0.987	0.999	0.999	1.000	1.000
35	0.362	0.710	0.937	0.994	0.999	1.000	1.000	1.000
40	0.384	0.754	0.959	0.997	0.999	1.000	1.000	1.000
50	0.426	0.826	0.983	0.999	0.999	1.000	1.000	1.000

Power of ANOVA for K = 4 groups and Significance Level, 0.05

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.051	0.056	0.065	0.077	0.114	0.169	0.242	0.330
3	0.053	0.064	0.084	0.112	0.203	0.339	0.504	0.671
4	0.055	0.072	0.103	0.150	0.298	0.503	0.712	0.867
5	0.057	0.080	0.123	0.190	0.394	0.644	0.846	0.953
6	0.059	0.089	0.145	0.231	0.485	0.754	0.923	0.985
7	0.061	0.097	0.166	0.273	0.568	0.836	0.963	0.995
8	0.063	0.106	0.189	0.315	0.643	0.893	0.983	0.998
9	0.065	0.115	0.212	0.357	0.709	0.932	0.992	0.999
10	0.067	0.124	0.235	0.399	0.765	0.958	0.997	0.999
12	0.071	0.143	0.282	0.479	0.851	0.984	0.999	0.999
14	0.075	0.162	0.329	0.554	0.909	0.994	0.999	0.999
16	0.079	0.182	0.376	0.622	0.946	0.998	0.999	0.999
18	0.083	0.202	0.422	0.683	0.968	0.999	0.999	0.999
20	0.087	0.222	0.467	0.736	0.982	0.999	0.999	1.000
25	0.098	0.274	0.572	0.840	0.996	0.999	0.999	1.000
30	0.108	0.327	0.663	0.907	0.999	0.999	1.000	1.000
35	0.120	0.379	0.740	0.947	0.999	0.999	1.000	1.000
40	0.131	0.430	0.802	0.971	0.999	0.999	1.000	1.000
50	0.155	0.527	0.891	0.992	0.999	1.000	1.000	1.000

Power of ANOVA for K = 4 groups and Significance Level, 0.1

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.103	0.112	0.127	0.148	0.210	0.295	0.398	0.512
3	0.106	0.124	0.155	0.200	0.328	0.495	0.668	0.813
4	0.109	0.136	0.183	0.251	0.439	0.655	0.833	0.938
5	0.111	0.148	0.212	0.302	0.539	0.773	0.922	0.981
6	0.114	0.160	0.240	0.351	0.627	0.856	0.965	0.995
7	0.117	0.173	0.268	0.400	0.702	0.911	0.985	0.998
8	0.120	0.185	0.296	0.447	0.764	0.946	0.994	0.999
9	0.123	0.197	0.324	0.491	0.816	0.968	0.997	0.999
10	0.126	0.210	0.352	0.534	0.857	0.981	0.999	0.999
12	0.132	0.235	0.406	0.613	0.917	0.994	0.999	0.999
14	0.138	0.260	0.458	0.681	0.953	0.998	0.999	0.999
16	0.144	0.285	0.508	0.740	0.974	0.999	0.999	0.999
18	0.150	0.309	0.555	0.790	0.986	0.999	0.999	1.000
20	0.156	0.334	0.598	0.832	0.992	0.999	0.999	1.000
25	0.171	0.395	0.695	0.907	0.998	0.999	1.000	1.000
30	0.187	0.453	0.772	0.950	0.999	0.999	1.000	1.000
35	0.202	0.508	0.833	0.974	0.999	0.999	1.000	1.000
40	0.217	0.560	0.879	0.987	0.999	1.000	1.000	1.000
50	0.249	0.652	0.939	0.996	0.999	1.000	1.000	1.000

Power of ANOVA for K = 4 groups and Significance Level, 0.2

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.204	0.219	0.244	0.278	0.369	0.483	0.606	0.722
3	0.209	0.237	0.283	0.344	0.503	0.677	0.823	0.920
4	0.213	0.253	0.319	0.405	0.613	0.803	0.925	0.979
5	0.217	0.270	0.354	0.462	0.701	0.883	0.969	0.994
6	0.221	0.286	0.387	0.515	0.772	0.932	0.988	0.998
7	0.225	0.301	0.420	0.564	0.828	0.962	0.995	0.999
8	0.229	0.317	0.451	0.609	0.872	0.978	0.998	0.999
9	0.234	0.332	0.482	0.650	0.905	0.988	0.999	0.999
10	0.238	0.348	0.511	0.688	0.930	0.993	0.999	0.999
12	0.246	0.378	0.566	0.754	0.963	0.998	0.999	0.999
14	0.254	0.407	0.616	0.807	0.981	0.999	0.999	0.999
16	0.262	0.435	0.661	0.850	0.990	0.999	0.999	1.000
18	0.270	0.462	0.703	0.885	0.995	0.999	0.999	1.000
20	0.278	0.489	0.739	0.912	0.997	0.999	0.999	1.000
25	0.297	0.551	0.815	0.956	0.999	0.999	1.000	1.000
30	0.317	0.608	0.871	0.978	0.999	0.999	1.000	1.000
35	0.336	0.659	0.911	0.990	0.999	1.000	1.000	1.000
40	0.355	0.705	0.940	0.995	0.999	1.000	1.000	1.000
50	0.392	0.781	0.973	0.999	0.999	1.000	1.000	1.000

Power of ANOVA for K = 5 groups and Significance Level, 0.05

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.051	0.055	0.063	0.074	0.108	0.159	0.228	0.315
3	0.053	0.062	0.079	0.104	0.185	0.310	0.469	0.638
4	0.054	0.069	0.095	0.136	0.269	0.463	0.673	0.841
5	0.056	0.076	0.113	0.171	0.356	0.600	0.815	0.939
6	0.057	0.083	0.131	0.207	0.441	0.713	0.902	0.979
7	0.059	0.090	0.150	0.244	0.522	0.801	0.950	0.993
8	0.061	0.098	0.169	0.282	0.596	0.865	0.976	0.997
9	0.062	0.105	0.189	0.320	0.663	0.911	0.989	0.999
10	0.064	0.113	0.209	0.358	0.722	0.943	0.995	0.999
12	0.067	0.129	0.251	0.434	0.816	0.977	0.999	0.999
14	0.071	0.146	0.294	0.506	0.882	0.991	0.999	0.999
16	0.074	0.163	0.337	0.573	0.927	0.997	0.999	0.999
18	0.078	0.180	0.380	0.635	0.956	0.999	0.999	0.999
20	0.081	0.198	0.422	0.691	0.974	0.999	0.999	1.000
25	0.090	0.244	0.523	0.803	0.993	0.999	0.999	1.000
30	0.099	0.291	0.614	0.879	0.998	0.999	1.000	1.000
35	0.109	0.339	0.694	0.929	0.999	0.999	1.000	1.000
40	0.119	0.387	0.761	0.959	0.999	0.999	1.000	1.000
50	0.139	0.479	0.860	0.987	0.999	1.000	1.000	1.000

Power of ANOVA for K = 5 groups and Significance Level, 0.1

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.102	0.110	0.123	0.142	0.198	0.276	0.375	0.486
3	0.105	0.120	0.148	0.187	0.302	0.459	0.630	0.782
4	0.107	0.131	0.172	0.231	0.403	0.613	0.800	0.921
5	0.110	0.141	0.196	0.276	0.497	0.734	0.900	0.974
6	0.112	0.152	0.221	0.321	0.583	0.823	0.952	0.992
7	0.115	0.162	0.246	0.365	0.659	0.886	0.978	0.997
8	0.117	0.173	0.271	0.409	0.724	0.928	0.990	0.999
9	0.120	0.184	0.296	0.451	0.779	0.955	0.996	0.999
10	0.122	0.194	0.321	0.492	0.824	0.973	0.998	0.999
12	0.127	0.216	0.371	0.568	0.892	0.990	0.999	0.999
14	0.132	0.238	0.419	0.637	0.936	0.996	0.999	0.999
16	0.137	0.260	0.466	0.698	0.963	0.999	0.999	0.999
18	0.143	0.283	0.511	0.751	0.979	0.999	0.999	0.999
20	0.148	0.305	0.554	0.796	0.988	0.999	0.999	1.000
25	0.161	0.360	0.651	0.880	0.997	0.999	0.999	1.000
30	0.174	0.414	0.731	0.932	0.999	0.999	1.000	1.000
35	0.188	0.466	0.797	0.963	0.999	0.999	1.000	1.000
40	0.201	0.516	0.849	0.980	0.999	0.999	1.000	1.000
50	0.228	0.607	0.919	0.994	0.999	1.000	1.000	1.000

Power of ANOVA for K = 5 groups and Significance Level, 0.2

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.204	0.217	0.238	0.268	0.350	0.456	0.574	0.691
3	0.208	0.232	0.272	0.326	0.472	0.640	0.791	0.899
4	0.211	0.246	0.303	0.381	0.576	0.769	0.904	0.970
5	0.215	0.260	0.335	0.433	0.663	0.856	0.958	0.992
6	0.218	0.274	0.365	0.482	0.736	0.912	0.982	0.997
7	0.222	0.288	0.394	0.529	0.795	0.948	0.993	0.999
8	0.225	0.302	0.423	0.572	0.843	0.970	0.997	0.999
9	0.229	0.316	0.451	0.613	0.880	0.982	0.998	0.999
10	0.232	0.329	0.479	0.650	0.910	0.990	0.999	0.999
12	0.239	0.356	0.531	0.717	0.949	0.997	0.999	0.999
14	0.246	0.382	0.579	0.773	0.972	0.999	0.999	0.999
16	0.253	0.408	0.624	0.820	0.985	0.999	0.999	0.999
18	0.260	0.434	0.665	0.858	0.992	0.999	0.999	1.000
20	0.267	0.458	0.702	0.888	0.996	0.999	0.999	1.000
25	0.285	0.517	0.782	0.941	0.999	0.999	1.000	1.000
30	0.302	0.572	0.843	0.970	0.999	0.999	1.000	1.000
35	0.319	0.622	0.888	0.985	0.999	0.999	1.000	1.000
40	0.336	0.667	0.921	0.992	0.999	1.000	1.000	1.000
50	0.369	0.746	0.962	0.998	0.999	1.000	1.000	1.000

Power of ANOVA for K = 6 groups and Significance Level, 0.05

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.051	0.055	0.062	0.072	0.103	0.151	0.217	0.302
3	0.052	0.061	0.076	0.098	0.172	0.288	0.442	0.610
4	0.054	0.067	0.090	0.127	0.248	0.432	0.641	0.818
5	0.055	0.073	0.105	0.157	0.328	0.565	0.787	0.925
6	0.056	0.079	0.121	0.190	0.408	0.678	0.881	0.972
7	0.058	0.085	0.138	0.223	0.486	0.770	0.937	0.990
8	0.059	0.092	0.155	0.258	0.559	0.839	0.968	0.997
9	0.061	0.098	0.173	0.293	0.625	0.891	0.985	0.999
10	0.062	0.105	0.192	0.328	0.686	0.927	0.993	0.999
12	0.065	0.119	0.229	0.399	0.785	0.969	0.998	0.999
14	0.068	0.134	0.268	0.468	0.857	0.988	0.999	0.999
16	0.071	0.149	0.308	0.534	0.908	0.995	0.999	0.999
18	0.074	0.165	0.348	0.596	0.943	0.998	0.999	0.999
20	0.077	0.181	0.388	0.652	0.965	0.999	0.999	0.999
25	0.085	0.222	0.485	0.769	0.990	0.999	0.999	1.000
30	0.093	0.266	0.575	0.853	0.997	0.999	1.000	1.000
35	0.102	0.310	0.655	0.910	0.999	0.999	1.000	1.000
40	0.110	0.354	0.725	0.947	0.999	0.999	1.000	1.000
50	0.128	0.442	0.832	0.983	0.999	1.000	1.000	1.000

Power of ANOVA for K = 6 groups and Significance Level, 0.1

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.102	0.109	0.121	0.138	0.189	0.262	0.357	0.466
3	0.104	0.118	0.142	0.178	0.283	0.431	0.599	0.756
4	0.106	0.127	0.164	0.218	0.377	0.580	0.772	0.904
5	0.108	0.136	0.186	0.258	0.466	0.702	0.879	0.966
6	0.111	0.146	0.208	0.299	0.549	0.795	0.939	0.989
7	0.113	0.155	0.230	0.340	0.623	0.863	0.971	0.996
8	0.115	0.165	0.253	0.381	0.690	0.910	0.986	0.999
9	0.117	0.174	0.276	0.420	0.747	0.943	0.994	0.999
10	0.120	0.184	0.299	0.459	0.795	0.964	0.997	0.999
12	0.124	0.203	0.345	0.533	0.870	0.986	0.999	0.999
14	0.128	0.223	0.390	0.601	0.920	0.995	0.999	0.999
16	0.133	0.243	0.435	0.663	0.952	0.998	0.999	0.999
18	0.138	0.263	0.478	0.717	0.972	0.999	0.999	0.999
20	0.142	0.284	0.519	0.765	0.984	0.999	0.999	1.000
25	0.154	0.335	0.615	0.856	0.996	0.999	0.999	1.000
30	0.166	0.385	0.697	0.915	0.999	0.999	1.000	1.000
35	0.178	0.434	0.765	0.952	0.999	0.999	1.000	1.000
40	0.190	0.482	0.821	0.973	0.999	0.999	1.000	1.000
50	0.214	0.572	0.900	0.992	0.999	1.000	1.000	1.000

Power of ANOVA for K = 6 groups and Significance Level, 0.2

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.203	0.215	0.234	0.261	0.336	0.436	0.550	0.666
3	0.207	0.228	0.264	0.314	0.449	0.611	0.764	0.881
4	0.210	0.241	0.293	0.364	0.548	0.740	0.885	0.961
5	0.213	0.254	0.321	0.412	0.633	0.832	0.946	0.988
6	0.216	0.266	0.349	0.458	0.706	0.894	0.976	0.996
7	0.219	0.279	0.376	0.502	0.767	0.935	0.990	0.999
8	0.222	0.291	0.403	0.544	0.818	0.960	0.995	0.999
9	0.226	0.304	0.429	0.583	0.858	0.976	0.998	0.999
10	0.229	0.316	0.455	0.620	0.891	0.986	0.999	0.999
12	0.235	0.341	0.504	0.687	0.936	0.995	0.999	0.999
14	0.241	0.365	0.551	0.744	0.964	0.998	0.999	0.999
16	0.248	0.389	0.594	0.793	0.980	0.999	0.999	0.999
18	0.254	0.412	0.635	0.834	0.989	0.999	0.999	1.000
20	0.260	0.435	0.672	0.867	0.994	0.999	0.999	1.000
25	0.276	0.491	0.753	0.926	0.998	0.999	1.000	1.000
30	0.291	0.543	0.817	0.961	0.999	0.999	1.000	1.000
35	0.307	0.592	0.867	0.979	0.999	0.999	1.000	1.000
40	0.322	0.637	0.904	0.989	0.999	1.000	1.000	1.000
50	0.353	0.716	0.952	0.997	0.999	1.000	1.000	1.000

Power of ANOVA for K = 7 groups and Significance Level, 0.05

	Effect Size						
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.051	0.054	0.061	0.070	0.099	0.144	0.208	0.290
3	0.052	0.060	0.073	0.094	0.162	0.271	0.419	0.585
4	0.053	0.065	0.086	0.120	0.232	0.406	0.613	0.796
5	0.054	0.070	0.100	0.147	0.306	0.535	0.761	0.911
6	0.056	0.076	0.114	0.177	0.381	0.648	0.862	0.965
7	0.057	0.082	0.130	0.207	0.456	0.742	0.924	0.987
8	0.058	0.088	0.145	0.239	0.527	0.815	0.960	0.995
9	0.060	0.094	0.161	0.272	0.593	0.871	0.980	0.998
10	0.061	0.100	0.178	0.305	0.654	0.912	0.990	0.999
12	0.063	0.112	0.213	0.372	0.756	0.961	0.997	0.999
14	0.066	0.126	0.248	0.438	0.834	0.984	0.999	0.999
16	0.069	0.139	0.285	0.502	0.890	0.993	0.999	0.999
18	0.072	0.153	0.323	0.563	0.929	0.997	0.999	0.999
20	0.074	0.168	0.360	0.619	0.956	0.999	0.999	0.999
25	0.081	0.206	0.453	0.739	0.987	0.999	0.999	1.000
30	0.089	0.246	0.541	0.829	0.996	0.999	1.000	1.000
35	0.096	0.287	0.622	0.892	0.999	0.999	1.000	1.000
40	0.104	0.328	0.693	0.934	0.999	0.999	1.000	1.000
50	0.120	0.411	0.806	0.977	0.999	1.000	1.000	1.000

Power of ANOVA for K = 7 groups and Significance Level, 0.1

	Effect Size						
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.102	0.108	0.119	0.135	0.182	0.252	0.342	0.448
3	0.104	0.116	0.139	0.171	0.269	0.409	0.574	0.732
4	0.106	0.125	0.158	0.207	0.356	0.552	0.747	0.888
5	0.108	0.133	0.178	0.245	0.440	0.674	0.860	0.958
6	0.110	0.141	0.198	0.282	0.520	0.769	0.927	0.985
7	0.112	0.150	0.219	0.321	0.594	0.842	0.963	0.995
8	0.114	0.158	0.240	0.359	0.660	0.894	0.982	0.998
9	0.116	0.167	0.261	0.396	0.719	0.930	0.992	0.999
10	0.118	0.176	0.282	0.433	0.769	0.955	0.996	0.999
12	0.122	0.194	0.325	0.505	0.849	0.982	0.999	0.999
14	0.126	0.212	0.367	0.571	0.904	0.993	0.999	0.999
16	0.130	0.230	0.409	0.633	0.940	0.997	0.999	0.999
18	0.134	0.249	0.451	0.688	0.964	0.999	0.999	0.999
20	0.138	0.268	0.491	0.737	0.979	0.999	0.999	1.000
25	0.149	0.315	0.584	0.833	0.994	0.999	0.999	1.000
30	0.159	0.362	0.667	0.899	0.998	0.999	1.000	1.000
35	0.170	0.409	0.737	0.940	0.999	0.999	1.000	1.000
40	0.181	0.455	0.796	0.966	0.999	0.999	1.000	1.000
50	0.204	0.542	0.882	0.989	0.999	1.000	1.000	1.000

Power of ANOVA for K = 7 groups and Significance Level, 0.2

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.203	0.214	0.231	0.256	0.326	0.420	0.530	0.645
3	0.206	0.226	0.258	0.304	0.431	0.587	0.741	0.863
4	0.209	0.237	0.285	0.351	0.525	0.716	0.867	0.953
5	0.212	0.249	0.311	0.396	0.609	0.810	0.935	0.985
6	0.215	0.260	0.336	0.439	0.681	0.877	0.970	0.995
7	0.218	0.272	0.362	0.481	0.743	0.922	0.986	0.998
8	0.220	0.283	0.387	0.521	0.795	0.951	0.994	0.999
9	0.223	0.295	0.412	0.559	0.838	0.970	0.997	0.999
10	0.226	0.306	0.436	0.595	0.873	0.982	0.999	0.999
12	0.232	0.329	0.483	0.662	0.924	0.994	0.999	0.999
14	0.238	0.352	0.528	0.720	0.955	0.998	0.999	0.999
16	0.243	0.374	0.570	0.770	0.974	0.999	0.999	0.999
18	0.249	0.396	0.610	0.812	0.985	0.999	0.999	1.000
20	0.255	0.418	0.647	0.848	0.992	0.999	0.999	1.000
25	0.269	0.471	0.729	0.913	0.998	0.999	0.999	1.000
30	0.283	0.521	0.795	0.951	0.999	0.999	1.000	1.000
35	0.298	0.568	0.847	0.974	0.999	0.999	1.000	1.000
40	0.312	0.612	0.888	0.986	0.999	1.000	1.000	1.000
50	0.340	0.691	0.941	0.996	0.999	1.000	1.000	1.000

Power of ANOVA for K = 8 groups and Significance Level, 0.05

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.051	0.054	0.060	0.069	0.096	0.139	0.200	0.280
3	0.052	0.059	0.071	0.091	0.154	0.257	0.399	0.563
4	0.053	0.064	0.083	0.114	0.218	0.384	0.588	0.775
5	0.054	0.069	0.096	0.139	0.288	0.509	0.738	0.898
6	0.055	0.074	0.109	0.166	0.359	0.621	0.843	0.958
7	0.056	0.079	0.123	0.195	0.430	0.716	0.911	0.984
8	0.058	0.084	0.137	0.224	0.500	0.793	0.952	0.994
9	0.059	0.090	0.152	0.255	0.565	0.853	0.975	0.998
10	0.060	0.095	0.167	0.286	0.625	0.897	0.987	0.999
12	0.062	0.107	0.199	0.349	0.730	0.953	0.997	0.999
14	0.065	0.119	0.233	0.412	0.812	0.980	0.999	0.999
16	0.067	0.132	0.267	0.474	0.873	0.991	0.999	0.999
18	0.070	0.145	0.302	0.534	0.916	0.996	0.999	0.999
20	0.072	0.158	0.338	0.590	0.946	0.998	0.999	0.999
25	0.079	0.193	0.427	0.712	0.983	0.999	0.999	1.000
30	0.085	0.230	0.512	0.806	0.995	0.999	0.999	1.000
35	0.092	0.268	0.592	0.874	0.998	0.999	1.000	1.000
40	0.099	0.307	0.664	0.921	0.999	0.999	1.000	1.000
50	0.114	0.386	0.781	0.971	0.999	1.000	1.000	1.000

Power of ANOVA for K = 8 groups and Significance Level, 0.1

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.102	0.108	0.118	0.133	0.177	0.242	0.329	0.432
3	0.103	0.115	0.136	0.165	0.257	0.390	0.551	0.711
4	0.105	0.123	0.153	0.199	0.339	0.529	0.724	0.873
5	0.107	0.130	0.172	0.234	0.419	0.649	0.842	0.950
6	0.109	0.138	0.190	0.269	0.497	0.746	0.914	0.982
7	0.111	0.146	0.209	0.305	0.569	0.822	0.956	0.994
8	0.112	0.154	0.229	0.341	0.635	0.878	0.978	0.998
9	0.114	0.162	0.248	0.376	0.694	0.918	0.989	0.999
10	0.116	0.170	0.268	0.412	0.745	0.946	0.995	0.999
12	0.120	0.186	0.308	0.481	0.829	0.978	0.999	0.999
14	0.124	0.203	0.349	0.546	0.888	0.991	0.999	0.999
16	0.127	0.220	0.389	0.606	0.929	0.996	0.999	0.999
18	0.131	0.237	0.428	0.662	0.956	0.998	0.999	0.999
20	0.135	0.255	0.467	0.712	0.973	0.999	0.999	0.999
25	0.145	0.299	0.558	0.812	0.993	0.999	0.999	1.000
30	0.154	0.344	0.641	0.883	0.998	0.999	1.000	1.000
35	0.164	0.388	0.712	0.929	0.999	0.999	1.000	1.000
40	0.175	0.432	0.773	0.958	0.999	0.999	1.000	1.000
50	0.195	0.516	0.864	0.986	0.999	1.000	1.000	1.000

Power of ANOVA for K = 8 groups and Significance Level, 0.2

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.203	0.213	0.229	0.252	0.318	0.407	0.513	0.626
3	0.206	0.224	0.254	0.297	0.416	0.567	0.721	0.847
4	0.208	0.234	0.279	0.340	0.506	0.695	0.851	0.944
5	0.211	0.245	0.303	0.382	0.588	0.791	0.924	0.981
6	0.213	0.256	0.327	0.424	0.660	0.861	0.963	0.994
7	0.216	0.267	0.351	0.464	0.722	0.909	0.983	0.998
8	0.219	0.277	0.374	0.502	0.775	0.942	0.992	0.999
9	0.221	0.288	0.398	0.539	0.820	0.964	0.996	0.999
10	0.224	0.298	0.421	0.575	0.857	0.978	0.998	0.999
12	0.229	0.320	0.465	0.640	0.911	0.992	0.999	0.999
14	0.235	0.341	0.508	0.698	0.947	0.997	0.999	0.999
16	0.240	0.362	0.550	0.749	0.969	0.999	0.999	0.999
18	0.245	0.383	0.589	0.792	0.982	0.999	0.999	0.999
20	0.250	0.403	0.625	0.830	0.990	0.999	0.999	1.000
25	0.264	0.454	0.707	0.899	0.997	0.999	0.999	1.000
30	0.277	0.502	0.775	0.942	0.999	0.999	1.000	1.000
35	0.290	0.548	0.829	0.968	0.999	0.999	1.000	1.000
40	0.304	0.591	0.872	0.982	0.999	0.999	1.000	1.000
50	0.330	0.669	0.931	0.995	0.999	1.000	1.000	1.000

Power of ANOVA for K = 9 groups and Significance Level, 0.05

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.051	0.054	0.060	0.068	0.094	0.134	0.193	0.270
3	0.052	0.058	0.070	0.088	0.147	0.244	0.381	0.544
4	0.053	0.063	0.081	0.110	0.207	0.366	0.565	0.756
5	0.054	0.067	0.093	0.133	0.272	0.486	0.716	0.884
6	0.055	0.072	0.105	0.158	0.340	0.597	0.826	0.950
7	0.056	0.077	0.117	0.184	0.409	0.693	0.898	0.980
8	0.057	0.082	0.131	0.212	0.476	0.772	0.943	0.992
9	0.058	0.087	0.144	0.240	0.540	0.835	0.970	0.997
10	0.059	0.092	0.159	0.270	0.600	0.883	0.984	0.999
12	0.061	0.103	0.188	0.330	0.706	0.944	0.996	0.999
14	0.063	0.114	0.219	0.390	0.791	0.975	0.999	0.999
16	0.066	0.125	0.252	0.450	0.855	0.989	0.999	0.999
18	0.068	0.137	0.285	0.509	0.903	0.995	0.999	0.999
20	0.070	0.150	0.319	0.564	0.936	0.998	0.999	0.999
25	0.076	0.182	0.404	0.687	0.979	0.999	0.999	1.000
30	0.082	0.217	0.487	0.784	0.994	0.999	0.999	1.000
35	0.089	0.253	0.566	0.857	0.998	0.999	1.000	1.000
40	0.095	0.289	0.638	0.908	0.999	0.999	1.000	1.000
50	0.109	0.365	0.758	0.965	0.999	1.000	1.000	1.000

Power of ANOVA for K = 9 groups and Significance Level, 0.1

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.101	0.107	0.117	0.131	0.173	0.235	0.318	0.419
3	0.103	0.114	0.133	0.161	0.247	0.375	0.532	0.692
4	0.105	0.121	0.150	0.192	0.324	0.508	0.704	0.858
5	0.106	0.128	0.167	0.225	0.401	0.627	0.825	0.941
6	0.108	0.135	0.184	0.258	0.476	0.725	0.902	0.978
7	0.110	0.143	0.202	0.292	0.547	0.803	0.948	0.992
8	0.111	0.150	0.220	0.326	0.612	0.862	0.973	0.997
9	0.113	0.157	0.238	0.360	0.671	0.906	0.987	0.999
10	0.115	0.165	0.257	0.394	0.724	0.937	0.993	0.999
12	0.118	0.180	0.295	0.460	0.810	0.973	0.998	0.999
14	0.122	0.196	0.333	0.524	0.873	0.989	0.999	0.999
16	0.125	0.212	0.371	0.583	0.918	0.995	0.999	0.999
18	0.129	0.228	0.409	0.638	0.948	0.998	0.999	0.999
20	0.132	0.244	0.446	0.689	0.968	0.999	0.999	0.999
25	0.141	0.286	0.536	0.792	0.991	0.999	0.999	1.000
30	0.150	0.328	0.617	0.867	0.997	0.999	1.000	1.000
35	0.160	0.371	0.689	0.917	0.999	0.999	1.000	1.000
40	0.169	0.413	0.751	0.950	0.999	0.999	1.000	1.000
50	0.189	0.495	0.847	0.983	0.999	1.000	1.000	1.000

Power of ANOVA for K = 9 groups and Significance Level, 0.2

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.203	0.212	0.227	0.249	0.311	0.396	0.499	0.610
3	0.205	0.222	0.251	0.291	0.404	0.550	0.703	0.832
4	0.208	0.232	0.273	0.331	0.491	0.676	0.835	0.936
5	0.210	0.242	0.296	0.372	0.570	0.773	0.914	0.977
6	0.213	0.252	0.319	0.411	0.640	0.846	0.957	0.992
7	0.215	0.262	0.341	0.449	0.703	0.897	0.979	0.997
8	0.217	0.272	0.364	0.486	0.757	0.933	0.990	0.999
9	0.220	0.282	0.386	0.522	0.803	0.957	0.995	0.999
10	0.222	0.292	0.408	0.557	0.841	0.973	0.998	0.999
12	0.227	0.312	0.451	0.621	0.899	0.990	0.999	0.999
14	0.232	0.332	0.492	0.679	0.938	0.996	0.999	0.999
16	0.237	0.352	0.532	0.730	0.963	0.998	0.999	0.999
18	0.242	0.372	0.570	0.774	0.978	0.999	0.999	0.999
20	0.247	0.391	0.606	0.813	0.987	0.999	0.999	1.000
25	0.260	0.439	0.688	0.886	0.997	0.999	0.999	1.000
30	0.272	0.486	0.756	0.933	0.999	0.999	1.000	1.000
35	0.284	0.530	0.812	0.962	0.999	0.999	1.000	1.000
40	0.297	0.573	0.857	0.979	0.999	0.999	1.000	1.000
50	0.322	0.650	0.920	0.994	0.999	1.000	1.000	1.000

Power of ANOVA for K = 10 groups and Significance Level, 0.05

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.051	0.054	0.059	0.067	0.091	0.130	0.186	0.262
3	0.052	0.058	0.069	0.086	0.141	0.234	0.366	0.525
4	0.052	0.062	0.079	0.106	0.198	0.349	0.545	0.738
5	0.053	0.066	0.090	0.128	0.259	0.466	0.696	0.871
6	0.054	0.070	0.101	0.151	0.324	0.575	0.808	0.943
7	0.055	0.075	0.113	0.176	0.390	0.671	0.886	0.976
8	0.056	0.080	0.125	0.202	0.455	0.752	0.935	0.991
9	0.057	0.084	0.138	0.228	0.518	0.817	0.964	0.996
10	0.058	0.089	0.151	0.256	0.577	0.868	0.981	0.998
12	0.060	0.099	0.179	0.313	0.684	0.935	0.995	0.999
14	0.063	0.109	0.209	0.371	0.771	0.970	0.998	0.999
16	0.065	0.120	0.239	0.429	0.839	0.987	0.999	0.999
18	0.067	0.131	0.270	0.486	0.889	0.994	0.999	0.999
20	0.069	0.143	0.303	0.541	0.926	0.997	0.999	0.999
25	0.075	0.173	0.384	0.664	0.975	0.999	0.999	1.000
30	0.080	0.206	0.465	0.764	0.992	0.999	0.999	1.000
35	0.086	0.240	0.543	0.840	0.997	0.999	1.000	1.000
40	0.092	0.275	0.614	0.895	0.999	0.999	1.000	1.000
50	0.105	0.347	0.737	0.958	0.999	1.000	1.000	1.000

Power of ANOVA for K = 10 groups and Significance Level, 0.1

	Effect Size							
n	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00
2	0.101	0.107	0.116	0.129	0.169	0.228	0.308	0.406
3	0.103	0.113	0.131	0.158	0.239	0.361	0.514	0.674
4	0.104	0.120	0.147	0.187	0.312	0.490	0.685	0.844
5	0.106	0.126	0.163	0.217	0.386	0.607	0.809	0.933
6	0.108	0.133	0.179	0.249	0.458	0.706	0.890	0.974
7	0.109	0.140	0.196	0.281	0.527	0.785	0.940	0.990
8	0.111	0.147	0.213	0.313	0.591	0.847	0.968	0.996
9	0.112	0.154	0.230	0.345	0.650	0.894	0.984	0.998
10	0.114	0.161	0.248	0.378	0.704	0.927	0.992	0.999
12	0.117	0.175	0.284	0.442	0.792	0.968	0.998	0.999
14	0.120	0.190	0.320	0.504	0.859	0.986	0.999	0.999
16	0.124	0.205	0.356	0.563	0.906	0.994	0.999	0.999
18	0.127	0.220	0.393	0.618	0.939	0.998	0.999	0.999
20	0.130	0.236	0.429	0.668	0.962	0.999	0.999	0.999
25	0.139	0.275	0.516	0.774	0.988	0.999	0.999	1.000
30	0.147	0.315	0.596	0.852	0.997	0.999	1.000	1.000
35	0.156	0.356	0.668	0.906	0.999	0.999	1.000	1.000
40	0.165	0.396	0.732	0.942	0.999	0.999	1.000	1.000
50	0.183	0.475	0.830	0.980	0.999	1.000	1.000	1.000

Source: fpower.sas macro retrieved from http://www.math.yorku.ca/SCS/Online/power/ on 1 March 1 2005.