CPK

PURPOSE

Compute the Process capability index (C_{pk}) for a variable.

DESCRIPTION

The process capability index measures the performance (i.e., the "capability") of an industrial process and is defined as follows:

C_{pk} = MINIMUM((USL - m),(m - LSL))/(3s)

where USL and LSL are the upper and lower specification limits, m is the sample mean, and s is the sample standard deviation. The USL and LSL are user defined limits within which a product is considered acceptable (values outside these limits indicate that a product is defective). This is the asymmetric case for the C_p command. See the documentation for CP for a description of the C_p index.

SYNTAX

LET <par> = CPK <y> <SUBSET/EXCEPT/FOR qualification>

where <y> is a response variable;

<par> is a parameter where the computed C_{pk} index is stored;

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = CPK Y1

LET A = CPK Y1 SUBSET TAG > 2

NOTE 1

Recall that Chebychev's thereom states that at least 75% of a variables observations must fall within plus or minus 2 standard deviations of the mean and that at least 88% of them must fall within plus or minus 3 standard deviations. This is for any distribution. For a normal distribution, these numbers are 95.4% and 99.7% respectively.

NOTE 2

The upper and lower specification limits must be specified by the user as follows:

LET LSL = <value>

LET USL = < value>

NOTE 3

If the specification limits are symmetric about the mean, the CPK and the CP statistics are identical. The CPK statistic may be the better choice when this is not the case.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

CPK PLOT	=	Generate a C_{pk} versus subset plot.
CONTROL CHART	=	Generate a control chart.
CP	=	Compute the C_p index.
PERCENT DEFECTIVE	=	Compute the percentage of defectives in a sample.
EXPECTED LOSS	=	Compute the expected loss of a sample.

REFERENCE

"Guide to Quality Control," Kaoru Ishikawa, Asian Productivity Organization, 1982.

APPLICATIONS

Quality Control

IMPLEMENTATION DATE

90/12

PROGRAM

```
SKIP 25
READ GEAR.DAT DIAMETER
LET LSL = 0.99
LET USL = 1.01
LET A = CP DIAMETER
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The computed C_p value is 0.40.