

Set of elements

AAAB	AABA	ABAA	
AAAC	AACA	ACAA	AAAA ACCC
AAAD	AADA	ADAA	

AABB	ABBA
AABD	ABDA
AADB	ADBA
AADD	ADDA

AABC	ABCA	ADCC] I
AADC	ADCA	ABCC	

AACB	ACBA	ACCB ACCD] II
AACD	ACDA	ACCB	

ABAD	ADAB] III
ABAC	ACAB	
ADAC	ACAD	

ABCD	ADCB] IV
ABCB	ADCD	

ABBC	ADDC
ACBB	ACDD

ABBB
 ABBD
 ABDB
 ABDD

ADBB
 ADBD

ADDB
 ADDD

Proof that 24 is maximum

2.

1. From set of 26 we must eliminate both ACBB and ACDD.

If ACBB is included, then ADDD and ABDD are excluded; similarly, if ACDD is included, then ADBB and ABDB are excluded. Therefore both ACBB and ACDD must be eliminated, to achieve 25. ✓

~~ACBB and ACDD cannot be eliminated~~

Can a code of 25 be written down?

1. A...A cannot be excluded.

If all A...A are excluded then AAAB and AAAD are obligatory. ✓ But both AD.. and AB.. must be included because of ~~with~~ the single choices ✓ A (no C, no A). This makes it impossible to have either ABAD or ADAB. Both are eliminated, hence 25 cannot be written. ✓

2. Compatibility systems.

III	ABAC	ACDC	ACAB
	ABAD		ADAB
	ACAD	ACBC	ADAC.

Choose ABAD. Excludes all ..AB. Eliminates ACAB. ✓
choose ABAC or ACDC.

Choose ABAC. No restrictions.

Choose ACAD excludes all ..AC not possible ✓

ACBC excludes all ..AD not possible ✓

ADAC possible.

Choice 1. ABAD ABAC ADAC

Choose ACDC excludes all ..AB, also ADAC.

Choose ACAD possible

ACBC excludes all ..AD not possible. ✓

Choice 2. ABAD. ACDC. ACAD

Choice 3. ADAB ADAC ABAC

R~D

Choice 4. ADAB ACBC ACAB

IV ~~ABCD~~ ABCD ADCB
 ABCB ADCD.

~~Most~~ If ABCD chosen then eliminates both ADCB and ADCB. ✓

Hence choices are 1. ABCD ABCB
 2. ADCB ADCB

Note (a) not possible to exclude both ABC and ADC. ✓
 (b) both ...CB and ...CD are obligatory endings. ✓

II AACB ACCD ACBA
 AACD ACCB ACDA

Since both ...CB and ...CD are obligatory endings, it is not possible to have ~~both~~ ACBA and ACDA. Hence these can be eliminated. ✓

Choose AACB ~~excludes all beginning with ACB, since shown that ...A cannot be eliminated.~~ Also excludes all ACCD. Hence the second choice must be AACD. This excludes all beginning with ~~ACD~~, and this is impossible.

Hence there is only ^{two} ~~one~~ choices here 1. AACB AACD
 2. ACCD ACCB ✓ because ACCD excluded AACD

I AABC ADCC ABCA
 AADC ABCC ADCA.

choose AABC excludes all ABC. ✓
 leaves AADC and ADCA ~~choices~~
 AADC eliminates all ADC, not possible.

Hence (i) AABC and ADCA

Choose ADCC, eliminates all ABC. ^c_b ✓
 AADC eliminates all ADC not possible

(ii) ADCC and ADCA ✓

AABC AADC

5.

choose ABCA.

eliminates all ADC^c_D

cannot choose ADCA as eliminates all ABC.

Hence

(iii) ABCA and AADC

(iv) ABCA and ABCC ✓

ba

We now write down choices.

III | ABAD
 | ABAC
 | ADAC

excludes
 all ..AB AABA
 all AC.. AADA

Hence

II | AACB
 | AACD

all ACC.. AAAC, ADAA, ACAA

I | AABC } ADCC }
 | ADCA } ADCA }

A BCA }
 AADC } ABCC }

IV | ADCB ABCD
 | ADCD ABCB

ABAA

eliminates AAAD.

AACA

(no AAAD, AADA, ADAA)

~~ABBB~~ AB BB

~~ABBB~~ eliminates A ABB

~~ABBD~~ AB BD

ABDB

eliminates A ABD

ABDD

ADBB

eliminates AADB

ADBD

ADDB

eliminates AADD

ADDD

ABBA

ABDA

of form A^{no} C ..

ADBA

ADDA

ABBC or ADDC.

7.

III 2. ABAD
ACDC
ACAD

eliminates
all ... AB

all ... BC, all ... AC

Hence from

II
must choose ACCD
ACCB

all ... BA all AAC.
all ... DA

I ADCC } ABCA } ABCA }
ADCA } ABCC } AADC }
ADCB } ABCD } ABCD }
ADCD } ABCB } ABCB }

ABCA
AADC
ABCD
ABCB

ABAA
ACAA
A AAD ACCC
 ADAA

ABAA
ACAA

AABB }
AABD } eliminated
AADB }
AADD }

ADDC

#8

Consider ACAA and ACCC since ... AA is obligatory, then ACCC is eliminated.

then ACAA is given. This eliminates all ... CC

ADAA is eliminated
also A AAD

hence only ~~24~~ with this choice.