Universiteit van Stellenbosch

Toegepaste Wiskunde 314

Tutoriaal 4: Donderdag 11 Maart 2004

MEMORANDUM

(1) Die gevraagde kritptoteks is `RSIIWTNSNOHSCRUICHLL`.

(2) Die gevraagde skoonteks is `endingasentencewithaprepositionissomethingupwit`
`hwhichiwillnotput`, oftewel "Ending a sentence with a preposition is something up
with which I will not put" (ná invoeging van spasies).

(3) Die sleutel is $\pi_3 = [2, 4, 1, 3]$ en die skoonteks is `historywillbekindtomeforiinten`
`dtowriteit`, oftewel "History will be kind to me for I intend to write it" (ná invoeg-
ing van spasies).

(4) (a) $\pi' = [1, 3, 2, 4, 6, 5, 7, 9, 8, 10, 12, 11]$.

  (b) $\pi'' = [1, 3, 2]$.

(5) (a) Die matriks $\mathbf{S_1}$ is nie–singulier, aangesien $|\mathbf{S_1}| = -67 \equiv 11 \pmod{26}$, en
ggd$(11, 26) = 1$.

  (b) Die matriks $\mathbf{S_2}$ is singulier, aangesien $|\mathbf{S_2}| = -122 \equiv 8 \pmod{26}$, en ggd$(8, 26) = 2 \neq 1$.

  (c) Die matriks $\mathbf{S_3}$ is nie–singulier, aangesien $|\mathbf{S_3}| = 1\,019 \equiv 5 \pmod{26}$, en
ggd$(5, 26) = 1$.

  (d) Die matriks $\mathbf{S_4}$ is singulier, aangesien $|\mathbf{S_4}| = -3\,860 \equiv 14 \pmod{26}$, en
ggd$(14, 26) = 2 \neq 1$.

(6) (a) $\mathbf{S_1}^{-1} = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$

  (b) $\mathbf{S_2}^{-1}$ bestaan nie.

  (c) $\mathbf{S_3}^{-1} = \begin{bmatrix} 2 & 9 & 22 \\ 18 & 9 & 25 \\ 11 & 19 & 12 \end{bmatrix}$

  (d) $\mathbf{S_4}^{-1}$ bestaan nie.

(7) (a) Die kriptoteks is `HTKDAWWUDEYEPMQQMDSLFTNNIZMKDN`.

  (b) Die kriptoteks is `ANWYKQTDYTCZUGBBMSTQREHDPIBPJQ`.

(8) (a) Die skoonteks is `idolikepigsdogslookuptouscatslookdownonuspigstreatu`
`sasequals`, oftewel "I do like pigs. Dogs look up to us. Cats look down on us.
Pigs treat us as equals" (ná invoeging van spasies en leesteens).

  (b) Selfde as in (a).

(9) Die sleutel is

$$\mathbf{S_5} = \begin{bmatrix} 16 & 17 & 18 \\ 0 & 23 & 1 \\ 11 & 18 & 9 \end{bmatrix}$$

en die ooreenstemmende skoonteks is `headsofstate`, oftewel "heads of state" (ná invoeging van spasies).

(10) Die ooreenstemmende matriks is

$$\mathbf{S}^{\pi_1} = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$