A2 $[7,3]_{77}$ - RSC

a)

$$H = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 3 & 5 & 7 & 9 & 11 & 13 \\ 1 & 9 & 8 & 15 & 13 & 2 & 16 \\ 1 & 10 & 6 & 3 & 15 & 5 & 4 \end{pmatrix}$$

II - I
III - I
IV - I

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 2 & 4 & 6 & 8 & 10 & 12 \\ 0 & 8 & 7 & 14 & 12 & 1 & 15 \\ 0 & 9 & 5 & 2 & 14 & 4 & 3 \end{pmatrix}$$

II ÷ 2
III · 77
IV · 2

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 0 & 1 & 3 & 6 & 10 & 15 & 4 \\ 0 & 1 & 10 & 4 & 11 & 8 & 6 \end{pmatrix}$$

III - II
IV - II

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 0 & 0 & 1 & 3 & 6 & 10 & 15 \\ 0 & 0 & 8 & 1 & 7 & 3 & 0 \end{pmatrix}$$

IV · 15

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 0 & 0 & 1 & 3 & 6 & 10 & 15 \\ 0 & 0 & 1 & 15 & 3 & 11 & 0 \end{pmatrix}$$

IV - III

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 0 & 0 & 1 & 3 & 6 & 10 & 15 \\ 0 & 0 & 0 & 12 & 14 & 1 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 0 & 0 & 1 & 3 & 6 & 10 & 15 \\ 0 & 0 & 0 & 1 & 4 & 10 & 3 \end{pmatrix}$$

Fil II · 10

$$\begin{pmatrix} 1 & 1 & 1 & 0 & 14 & 8 & 15 \\ 0 & 1 & 2 & 0 & 9 & 9 & 14 \\ 0 & 0 & 1 & 0 & 11 & 14 & 6 \\ 0 & 0 & 0 & 1 & 4 & 10 & 3 \end{pmatrix}$$

Fil III − 3 · Fil IV → Fil III

$$\begin{pmatrix} 1 & 1 & 0 & 0 & 3 & 11 & 9 \\ 0 & 1 & 0 & 0 & 4 & 15 & 2 \\ 0 & 0 & 1 & 0 & 11 & 14 & 6 \\ 0 & 0 & 0 & 1 & 4 & 10 & 3 \end{pmatrix}$$

Fil II − 2 · Fil III → Fil II

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 16 & 13 & 7 \\ 0 & 1 & 0 & 0 & 4 & 15 & 2 \\ 0 & 0 & 1 & 0 & 11 & 14 & 6 \\ 0 & 0 & 0 & 1 & 4 & 10 & 3 \end{pmatrix}$$

Fil I − Fil II → Fil I

$$\Rightarrow G = \begin{pmatrix} 1 & 13 & 6 & 13 & 1 & 0 & 0 \\ 4 & 2 & 3 & 7 & 0 & 1 & 0 \\ 10 & 15 & 11 & 14 & 0 & 0 & 1 \end{pmatrix}$$

b) $c = 6 \cdot (1, 13, 6, 13, 1, 0, 0) + 7(4, 2, 3, 7, 0, 1, 0) + 8(10, 15, 11, 14, 0, 0, 1)$

$c = (6, 10, 2, 10, 6, 0, 0) + (11, 14, 4, 15, 0, 7, 0) + (12, 1, 3, 10, 0, 0, 8)$

$c = (12, 8, 9, 1, 6, 7, 8)$

$$\tilde{c} = 11 \cdot (1, 13, 6, 13, 1, 0, 0) + 8(4, 2, 3, 7, 0, 1, 0) + 4(10, 15, 11, 14, 0, 0, 1)$$

$$\tilde{c} = (11, 7, 15, 5, 11, 0, 0) + (15, 16, 7, 5, 0, 8, 0) + (6, 9, 10, 5, 0, 0, 4)$$

$$\tilde{c} = (15, 15, 15, 15, 11, 8, 4)$$

17
34
57
68
85
102
119
136
153
170

A3

a)

$$H = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & \alpha^2 & (\alpha^2+\alpha) & (\alpha^2+1) & \alpha & (\alpha+1) \end{pmatrix}$$

$\Rightarrow$ $H - 1$

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & \alpha^6 & \alpha^5 & \alpha^2 & \alpha^3 & \alpha \end{pmatrix}$$

$H - \alpha H$, $\Rightarrow \cdot \alpha$

$$\begin{pmatrix} 1 & 0 & \alpha^2 & \alpha & (\alpha^2+\alpha+1) & (\alpha^2+1) \\ 0 & 1 & (\alpha^2+1) & (\alpha+1) & (\alpha^2+\alpha) & \alpha^2 \end{pmatrix}$$

$\Rightarrow$

$$G = \begin{pmatrix} \alpha^2 & (\alpha^2+1) & 1 & 0 & 0 & 0 \\ \alpha & (\alpha+1) & 0 & 1 & 0 & 0 \\ (\alpha^2+\alpha+1) & (\alpha^2+\alpha) & 0 & 0 & 1 & 0 \\ (\alpha^2+1) & \alpha^2 & 0 & 0 & 0 & 1 \end{pmatrix}$$

b)

$$c = \alpha(\alpha^2, \alpha^2+1, 1, 0, 0, 0) + \alpha^2(\alpha, \alpha+1, 0, 1, 0, 0) + \alpha^3(\alpha^2+\alpha+1, \alpha^2+\alpha, 0, 0, 1, 0) + 1(\alpha^2+1, \alpha^2, 0, 0, 0, 1)$$

$$c = (\alpha+1, 1, \alpha, 0, 0, 0) + (\alpha+1, \alpha^2+\alpha+1, 0, \alpha^2, 0, 0) + (\alpha, 1, 0, 0, \alpha+1, 0) + (\alpha^2+1, \alpha^2, 0, 0, 0, 1)$$

$$c = (\alpha^2+\alpha+1, \alpha+1, \alpha, \alpha^2, \alpha+1, 1)$$

$$\tilde{c} = \alpha^6(\alpha^2, \alpha^2+1, 1, 0, 0, 0) + \alpha^4(\alpha, \alpha+1, 0, 1, 0, 0) + 1(\alpha^2+\alpha+1, \alpha^2+\alpha, 0, 0, 1, 0) + \alpha(\alpha^2+1, \alpha^2, 0, 0, 0, 1)$$

$$\tilde{c} = (\alpha, \alpha^2+\alpha+1, \alpha^2+1, 0, 0, 0) + (\alpha^2+\alpha+1, 1, 0, \alpha^2+\alpha, 0, 0) + (\alpha^2+\alpha+1, \alpha^2+\alpha, 0, 0, 1, 0) + (1, \alpha+1, 0, 0, 0, \alpha)$$

$$\tilde{c} = (\alpha+1, \alpha+1, \alpha^2+1, \alpha^2+\alpha, 1, \alpha)$$

A4 $[6,2]_8$ ~ RSC

a)

$$H = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & (\alpha^2+1) & (\alpha^2+\alpha+1) & (\alpha^2+\alpha) & (\alpha+1) & \alpha^3 \\ 1 & (\alpha^2+\alpha+1) & (\alpha+1) & \alpha & (\alpha^2+1) & (\alpha^2+\alpha) \\ 1 & (\alpha^2+\alpha) & \alpha & (\alpha^2+\alpha+1) & \alpha^2 & (\alpha^2+1) \end{pmatrix}$$

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & \alpha^2 & \alpha^4 & \alpha^5 & \alpha & \alpha^6 \\ 0 & \alpha^4 & \alpha & \alpha^3 & \alpha^2 & \alpha^5 \\ 0 & \alpha^5 & \alpha^3 & \alpha^4 & \alpha^6 & \alpha^2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & \alpha^2 & \alpha^3 & \alpha^6 & \alpha^4 \\ 0 & 1 & \alpha^4 & \alpha^6 & \alpha^5 & \alpha \\ 0 & 1 & \alpha^5 & \alpha^6 & \alpha & \alpha^4 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & \alpha^6 & \alpha & \alpha^2 & \alpha^5 \\ 0 & 1 & \alpha^2 & \alpha^3 & \alpha^6 & \alpha^4 \\ 0 & 0 & \alpha & \alpha^4 & \alpha & \alpha^2 \\ 0 & 0 & \alpha^3 & \alpha^4 & \alpha^5 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & \alpha^6 & \alpha & \alpha^2 & \alpha^5 \\ 0 & 1 & \alpha^2 & \alpha^3 & \alpha^6 & \alpha^4 \\ 0 & 0 & 1 & \alpha^3 & 1 & \alpha \\ 0 & 0 & 1 & \alpha & \alpha^2 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 & \alpha^4 & 1 & \alpha^4 \\ 0 & 1 & 0 & \alpha^2 & 1 & \alpha^6 \\ 0 & 0 & 1 & \alpha^3 & 1 & \alpha \\ 0 & 0 & 0 & 1 & \alpha^6 & \alpha \end{pmatrix}$$

$$\begin{matrix} I + \alpha^4 \cdot IV \\ II + \alpha^2 \cdot IV \\ \Rightarrow \\ III + \alpha^3 \cdot IV \end{matrix} \begin{pmatrix} 1 & 0 & 0 & 0 & \alpha & 1 \\ 0 & 1 & 0 & 0 & \alpha^3 & \alpha^4 \\ 0 & 0 & 1 & 0 & \alpha^6 & \alpha^2 \\ 0 & 0 & 0 & 1 & \alpha^6 & \alpha \end{pmatrix}$$

$$\Rightarrow G = \begin{pmatrix} \alpha & (\alpha+1) & (\alpha^2+1) & (\alpha^2+1) & 1 & 0 \\ 1 & (\alpha^2+\alpha) & \alpha^2 & \alpha & 0 & 1 \end{pmatrix}$$

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b) $c = \alpha \cdot (\alpha, \alpha+1, \alpha^2+1, \alpha^2+1, 1, 0)$
$+ \alpha^3 \cdot (1, \alpha^2+\alpha, \alpha^2, \alpha, 0, 1)$

$c = (\alpha^2, \alpha^2+\alpha, 1, 1, \alpha, 0)$
$+ (\alpha+1, 1, \alpha^2+\alpha+1, \alpha^2+\alpha, 0, \alpha+1)$

$$c = (\alpha^2+\alpha+1, \alpha^2+\alpha+1, \alpha^2+\alpha, \alpha^2+\alpha+1, \alpha, \alpha+1)$$

$\tilde{c} = \alpha^6 \cdot (\alpha, \alpha+1, \alpha^2+1, \alpha^2+1, 1, 0)$
$+ \alpha^4 \cdot (1, \alpha^2+\alpha, \alpha^2, \alpha, 0, 1)$

$\tilde{c} = (1, \alpha^2, \alpha^2+\alpha+1, \alpha^2+\alpha+1, \alpha^2+1, 0)$
$+ (\alpha^2+\alpha, \alpha, \alpha^2+1, \alpha^2+\alpha+1, 0, \alpha^2+\alpha)$

$$\tilde{c} = (\alpha^2+\alpha+1, \alpha^2+\alpha, \alpha, 0, \alpha^2+1, \alpha^2+\alpha)$$
