4

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} \quad R_1 \to R_1 - 3R_2$$ 2/2

Which is just the matrix representing D. ∴ D and E are isomorphic. This is so because T can be expressed as the identity matrix using row and column operations. It's the case that any matrix whose determinant is one can be so reduced to the identity matrix: instead of T, any 3x3 matrix whose determinant is one would have given the same result. 2/2

24/25

2) $3675 = 3 \times 5^2 \times 7^2$ 1/1

prime power	factors of d_{k-1}	d_k
7^2		7^2
	7	7
5^2		5^2
	5	5
3		3

2/2

∴ There $2 \times 2 \times 1 = 4$ Abelian groups order 3675. If we call these A, B, C, D, these are

The primary decompositions follow the 1st $\simeq$ signs

$A \simeq (\mathbb{Z}_3) \times (\mathbb{Z}_{25}) \times (\mathbb{Z}_{49}) \simeq \mathbb{Z}_{3675}$

$B \simeq (\mathbb{Z}_3) \times (\mathbb{Z}_5 \times \mathbb{Z}_5) \times (\mathbb{Z}_{49}) \simeq \mathbb{Z}_5 \times (\mathbb{Z}_3 \times \mathbb{Z}_5 \times \mathbb{Z}_{49})$
$\simeq \mathbb{Z}_5 \times \mathbb{Z}_{735}$

$C = (\mathbb{Z}_3) \times (\mathbb{Z}_{25}) \times (\mathbb{Z}_7 \times \mathbb{Z}_7) \simeq \mathbb{Z}_7 \times (\mathbb{Z}_3 \times \mathbb{Z}_7 \times \mathbb{Z}_{25})$
$\simeq \mathbb{Z}_7 \times \mathbb{Z}_{525}$

$D \simeq (\mathbb{Z}_3) \times (\mathbb{Z}_5 \times \mathbb{Z}_5) \times (\mathbb{Z}_7 \times \mathbb{Z}_7) \simeq (\mathbb{Z}_5 \times \mathbb{Z}_7) \times (\mathbb{Z}_3 \times \mathbb{Z}_5 \times \mathbb{Z}_7)$
$\simeq \mathbb{Z}_{35} \times \mathbb{Z}_{105}$

4/4