

(3)

$$\cong \mathbb{Z}_7 \times \mathbb{Z}_{25} \times \mathbb{Z}_9 \times \mathbb{Z} \times \mathbb{Z}_4 \times \mathbb{Z}_9$$

$$\cong \mathbb{Z}_9 \times (\mathbb{Z}_4 \times \mathbb{Z}_9 \times \mathbb{Z}_{25} \times \mathbb{Z}_7) \times \mathbb{Z}$$

$$\cong \mathbb{Z}_9 \times \mathbb{Z}_{6300} \times \mathbb{Z}$$

What are rank and torsion coefficients? $\frac{2}{3}$

The rank of C is 1, as B , but the torsion coefficients of B and C are not identical so B and C are not isomorphic. (The highest order of an element of C is 6300, but the highest order of an element of B is only 3150.) $\frac{1}{1}$

$$c) T = \begin{bmatrix} 1 & -3 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

Suppose $M = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$

$$\text{Then } TM = \begin{bmatrix} 1 & -3 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$= \begin{bmatrix} a-3d & b-3e & c-3f \\ d+g & e+h & f+i \\ g & h & i \end{bmatrix} \quad \checkmark \frac{2}{2}$$

Use row and column operations to find which group E is isomorphic to.

$$\begin{bmatrix} a-3d & b-3e & c-3f \\ d+g & e+h & f+i \\ g & h & i \end{bmatrix}$$

$$\begin{bmatrix} a-3d & b-3e & c-3f \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$R_2 \rightarrow R_2 - R_3 \quad \checkmark$$