

$$G = \left\{ \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix} \mid m \neq 0 \right\}$$

$$\rightarrow C(A) = \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} m & m+b \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} m & b+1 \\ 0 & 1 \end{bmatrix}$$

$$\begin{aligned} m+b &= b+1 \\ m &= 1 \end{aligned}$$

$$\Rightarrow C(A) = \begin{bmatrix} 1 & b \\ 0 & 1 \end{bmatrix} \in A$$

$$\rightarrow C(B) = \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} -m & b \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} -m & -b \\ 0 & 1 \end{bmatrix}$$

$$b = -b \quad \nexists \Rightarrow b = 0$$

$$C(B) = \begin{bmatrix} m & 0 \\ 0 & 1 \end{bmatrix}$$

$$\rightarrow Z(h) = \begin{bmatrix} x & y \\ 0 & 1 \end{bmatrix} \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x & y \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} mx & bx+y \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} mx & my+b \\ 0 & 1 \end{bmatrix}$$

$$bx+y = my+b$$

$$\Rightarrow \boxed{y=0 \text{ \& } x=1} \quad [\text{comparing coefficient of } m, b]$$

Thus

$$Z(G) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$\Rightarrow$ option (a) & (b) are correct

Now

option (c) $(A) \cap (B) = \begin{bmatrix} 1 & b \\ 0 & 1 \end{bmatrix} \cap \begin{bmatrix} m & 0 \\ 0 & 1 \end{bmatrix}$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = Z(G)$$

$\Rightarrow$ option (c) is incorrect

option (A)

$$(A) \cup (B) = \begin{bmatrix} 1 & b \\ 0 & 1 \end{bmatrix} \cup \begin{bmatrix} m & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} m & b \\ 0 & 1 \end{bmatrix} \neq Z(G)$$

$\Rightarrow$ option (A) is incorrect