

## QUESTION 1

A singular matrix is a matrix whose determinant is equal to zero, while a non-singular matrix is a matrix whose determinant is not equal to zero.

## QUESTION 2

$$\text{i. } |X| = \begin{pmatrix} 3 & 9 & 2 \\ 1 & 5 & 6 \\ 2 & 7 & 4 \end{pmatrix}$$

$$|X| = 3(20 - 42) - 9(4 - 12) + 2(7 - 10)$$

$$|X| = -66 + 72 - 6 = -0$$

$|X|$  EQUAL TO 0, Therefore, Matrix X is a Singular matrix

$$\text{ii. } |Y| = \begin{pmatrix} 0 & 5 & 0 \\ -3 & -7 & -1 \\ 2 & 1 & 9 \end{pmatrix}$$

$$|Y| = 0(171 + 1) - 5(-27 + 2) + 0(-3 + 14)$$

$$|Y| = 0 + 125 - 0 = 125$$

$|Y|$  NOT EQUAL TO 0, Therefore, Matrix Y is a Non-Singular matrix

$$\text{iii. } |C| = \begin{pmatrix} 1 & 7 & 8 \\ 1 & 0 & 5 \\ 11 & 6 & 12 \end{pmatrix}$$

$$|C| = 1(0 - 30) - 7(12 - 55) + 8(6 - 0)$$

$$|C| = -30 + 301 + 48 = 319$$

$|C|$  NOT EQUAL TO 0, Therefore, Matrix C is a Non-Singular matrix

$$\text{iv. } |P| = \begin{pmatrix} 0 & 25 & 0 \\ -15 & -35 & -5 \\ 10 & 5 & 45 \end{pmatrix}$$

$$|P| = 0(-15 \cdot 75 + 25) - 25(-675 + 50) + 0(-75 + 350)$$

$$|P| = -0 + 15625 - 0 = 15625$$

$|P| \neq 0$ , Therefore, Matrix 5Y is a Non-Singular matrix

$$\text{v. } |A| = \begin{pmatrix} 1 & 2 & 8 \\ 4 & 7 & 6 \\ 9 & 5 & 3 \end{pmatrix}$$

$$|A| = 1(21 - 30) - 2(12 - 54) + 8(20 - 63)$$

$$|A| = -9 + 84 - 344 = -269$$

$|A| \neq 0$  Therefore, Matrix A is a Non-Singular matrix