

Oyigberu Meshack Estikouso

18/ENG102/084

Matr 04

- 1 If the determinant of A , $|A| = 0$ then A is called a singular matrix
If the determinant of B , $|B| \neq 0$ then B is a non-singular matrix

- 2 i. Determine if matrix $A = \begin{pmatrix} 1 & 2 & 8 \\ 4 & 7 & 6 \\ 9 & 9 & 3 \end{pmatrix}$ is singular or non-singular

Solution

$$|A| = \begin{vmatrix} 1 & 2 & 8 \\ 4 & 7 & 6 \\ 9 & 9 & 3 \end{vmatrix}$$

$$= 1 \begin{vmatrix} 7 & 6 \\ 9 & 3 \end{vmatrix} - 2 \begin{vmatrix} 4 & 6 \\ 9 & 3 \end{vmatrix} + 8 \begin{vmatrix} 4 & 7 \\ 9 & 9 \end{vmatrix}$$

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

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

$|A| \neq 0 \therefore A$ is non-singular matrix

ii. $B = \begin{pmatrix} 3 & 9 & 2 \\ 1 & 9 & 6 \\ 2 & 7 & 4 \end{pmatrix}$

$$B = \begin{vmatrix} 3 & 9 & 2 \\ 1 & 9 & 6 \\ 2 & 7 & 4 \end{vmatrix}$$

$$|B| = 3 \begin{vmatrix} 9 & 6 \\ 7 & 4 \end{vmatrix} - 9 \begin{vmatrix} 1 & 6 \\ 2 & 4 \end{vmatrix} + 2 \begin{vmatrix} 1 & 9 \\ 2 & 7 \end{vmatrix}$$

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

$$= 3(22) - 9(-8) + 2(-3)$$

$$= -66 + 72 - 6$$

$$= 0$$

$|B| = 0 \therefore B$ is a singular matrix

$$\text{iii } C = \begin{pmatrix} 4 & 1 & -2 \\ 1 & 7 & 3 \\ 5 & 8 & 1 \end{pmatrix}$$

$$|C| = \begin{vmatrix} 4 & 1 & -2 \\ 1 & 7 & 3 \\ 5 & 8 & 1 \end{vmatrix}$$

$$= 4 \begin{vmatrix} 7 & 3 \\ 8 & 1 \end{vmatrix} - 1 \begin{vmatrix} 1 & 3 \\ 5 & 1 \end{vmatrix} - 2 \begin{vmatrix} 1 & 7 \\ 5 & 8 \end{vmatrix}$$

$$= 4(7-24) - 1(1-15) - 2(8-35)$$

$$= 4(-17) - 1(-14) - 2(-27)$$

$$= -68 + 14 + 54$$

$$|C| = 0$$

$\therefore C$ is a singular matrix

$$\text{iv } A = \begin{pmatrix} 4 & 5 \\ 2 & 3 \end{pmatrix}$$

$$|A| = \begin{vmatrix} 4 & 5 \\ 2 & 3 \end{vmatrix}$$

$$= (4)(3) - (2)(5)$$

$$= 12 - 10$$

$$|A| = 2$$

$|A| \neq 0 \therefore A$ is a non-singular matrix

$$\text{v } B = \begin{pmatrix} 3 & -4 \\ -6 & 8 \end{pmatrix}$$

$$|B| = \begin{vmatrix} 3 & -4 \\ -6 & 8 \end{vmatrix}$$

$$= (3)(8) - (-6)(-4)$$

$$= 24 - 24$$

$\therefore B$ is a singular matrix

$$|B| = 0$$