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Practice Questions
Chapter No. 16 to 18

MCQs

If $A=\begin{bmatrix} 3 & b \\ 5 & d \end{bmatrix}$, then which of the following is the determinant of A ?

(a) $3d+5b$
(b) $3d-5b$
(c) $5d+3b$
(d) $5d-3b$

If the matrix $A=\begin{bmatrix} 2 & 2 & 5 \\ 2 & 2 & 1 \\ 2 & 2 & 7 \end{bmatrix}$, then which of the following is true about it?

(a) Its determinant is -2 .
(b) Its determinant is 0 .
(c) Its determinant is 4 .
(d) The information is not sufficient to calculate the determinant .

Short

Question No. 1. If the following system of linear equations is solved using the Jacobi's method, then construct the matrix M from the coefficient matrix of the following linear system:

$$10x_1 + 2x_2 + 3x_3 = 5$$
$$3x_1 + 8x_2 + x_3 = 8$$
$$x_1 + 3x_2 + 7x_3 = 6$$

Answer: $M = \begin{bmatrix} 10 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 7 \end{bmatrix}$

Question No. 2. If the first iteration $y_1 = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ **,** then use the Jacobi Iteration to find next two iterations of the following system of equations**:**

$$10x_1 + x_2 = 30$$
$$x_1 + 12x_2 = 48$$

Answer: $y_2 = \begin{bmatrix} 2.7 \\ 3.8 \end{bmatrix}$, $y_3 = \begin{bmatrix} 2.6 \\ 3.8 \end{bmatrix}$

Question No. 3. Evaluate the determinant $\begin{vmatrix} 2 & 0 & 0 & 0 \\ 14 & 5 & 0 & 0 \\ -6 & 6 & -3 & 0 \\ 4 & 7 & -4 & -7 \end{vmatrix}$.

Answer: 210

Long

Question No. 4. Verify that $(\det A)(\det B) = \det(AB)$ **,** where $A = \begin{bmatrix} 4 & 2 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix}$.

Answer:

Given

$$A = \begin{bmatrix} 4 & 2 \\ 5 & 3 \end{bmatrix}, \qquad B = \begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix}$$

First calculate the determinants.

For matrix A:

$$\det(A) = (4)(3) - (2)(5) = 12 - 10 = 2$$

For matrix B:

$$\det(B) = (3)(4) - (7)(2) = 12 - 14 = -2$$

Thus,

$$(\det A)(\det B) = (2)(-2) = -4$$

Now compute AB:

$$AB = \begin{bmatrix} 4 & 2 \\ 5 & 3 \end{bmatrix} \begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 16 & 36 \\ 21 & 47 \end{bmatrix}$$

Now find its determinant:

$$\det(AB) = (16)(47) - (36)(21)$$

$$\det(AB) = 16 \cdot 47 - 36 \cdot 21$$

$$= 752 - 756 = -4$$

Therefore,

$$\boxed{(\det A)(\det B) = \det(AB) = -4}$$

Hence verified.