BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

Date: 12/11/2021

Subject: Mathematics

Topic : Matrices and Determinants

Class: Standard XII

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1. If a matrix $A = [a_{ij}]_{3\times 2}$ is given by $a_{ij} = \dfrac{i^2 + j^2}{2}$, then the matrix is

A. $\begin{bmatrix} 1 & \frac{5}{2} & 5 \\ \frac{5}{2} & 4 & \frac{13}{2} \end{bmatrix}$

B. $\begin{bmatrix} 1 & \frac{5}{2} \\ \frac{5}{2} & 4 \\ 5 & \frac{13}{2} \end{bmatrix}$

C. $\begin{bmatrix} 1 & \frac{3}{2} \\ \frac{3}{2} & 2 \\ 2 & \frac{5}{2} \end{bmatrix}$

D. $\begin{bmatrix} 1 & \frac{3}{2} & 2 \\ \frac{3}{2} & 2 & \frac{5}{2} \end{bmatrix}$

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2. Which of the following is a scalar matrix

A. $\begin{bmatrix} 5 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 7 \end{bmatrix}$

B. $\begin{bmatrix} 5 & 0 & 0 \\ 0 & -5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$

C. $\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & 1\frac{1}{2} & 0 \\ 0 & 0 & 2\frac{1}{2} \end{bmatrix}$

D. $\begin{bmatrix} 6 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 6 \end{bmatrix}$

3. If a matrix $A = [a_{ij}]$ is given as $A = \begin{bmatrix} 1 & 2 & 3 & -1 \\ 3 & -2 & 1 & 0 \\ 0 & 3 & 2 & 4 \end{bmatrix}$, then the value of $\sum_{i=1}^{3} a_{ii} =$

A. 0

B. 1

C. 7

D. 4

4. Let $A = [a_{ij}]_{2\times 2}$, where $a_{ij} = (i^2 - j^2)$, then, which of the following is correct

A. $A = \begin{bmatrix} 0 & -3 \\ 3 & 0 \end{bmatrix}$

B. Trace of A is a negative number

C. Trace of A is a positive number

D. $A = \begin{bmatrix} 0 & -1 \\ 3 & -3 \end{bmatrix}$

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5. A matrix having one row and many columns is known as

   A. Row matrix

   B. Column matrix

   C. Diagonal matrix

   D. Square matrix

6. If $2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$, then (x, y) is

   A. $(2, 6)$

   B. $(1, 6)$

   C. $(2, 9)$

   D. $(3, 6)$

7. If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then

   A. $\alpha = a^2 + b^2, \beta = ab$

   B. $\alpha = a^2 + b^2, \beta = 2ab$

   C. $\alpha = a^2 + b^2, \beta = a^2 - b^2$

   D. $\alpha = 2ab, \beta = a^2 + b^2$

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8. If the matrix $A = \begin{bmatrix} -1 & 2 \\ -3 & 4 \end{bmatrix}$ satisfies the quadratic function $f(x) = (x-1)(x-\alpha)$, then α is

   A. -2

   B. $\frac{2}{7}$

   C. 2

   D. $\frac{7}{2}$

9. If $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & -1 \\ 1 & 0 & -1 \end{bmatrix}$, then the matrix C such that $A + B + C$ is a zero matrix, is

   A. $\begin{bmatrix} -1 & 4 & -1 \\ -1 & 0 & -1 \end{bmatrix}$

   B. $\begin{bmatrix} -3 & 4 & -1 \\ -3 & 0 & -1 \end{bmatrix}$

   C. $\begin{bmatrix} -1 & 1 & -1 \\ -1 & 0 & -1 \end{bmatrix}$

   D. $\begin{bmatrix} -1 & 3 & -1 \\ -3 & 0 & -1 \end{bmatrix}$

10. If $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $E = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, then $(aI + bE)^3 =$

    A. $aI + bE$

    B. $a^3I + 3a^2bE$

    C. $a^3I + 3ab^2E$

    D. $a^3I + b^3E$

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11. If $A = \begin{bmatrix} -1 & 0 & 2 \\ 3 & 1 & 4 \end{bmatrix}, B = \begin{bmatrix} 0 & -2 & 5 \\ 1 & -3 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & -5 & -2 \\ 6 & 0 & -4 \end{bmatrix}$, then $2A - 3B + 4C$ is

A. $\begin{bmatrix} 2 & -14 & -19 \\ 27 & 11 & -11 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 11 & -19 \\ -14 & 11 & -11 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -14 & -19 \\ 11 & 17 & -11 \end{bmatrix}$

D. $\begin{bmatrix} -14 & -14 & -2 \\ 17 & 11 & -11 \end{bmatrix}$

12. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, then the value of α for which $A^2 = B$ is:

A. 1

B. 2

C. 4

D. No real values.

13. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then the correct statement is

A. $A^2 + 5A - 7I = O$

B. $-A^2 + 5A + 7I = O$

C. $A^2 - 5A + 7I = O$

D. $A^2 + 5A + 7I = O$

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14. $A = \begin{bmatrix} 3 & a & -1 \\ 2 & 5 & c \\ b & 8 & 2 \end{bmatrix}$ is symmetric and $B = \begin{bmatrix} d & 3 & a \\ b-a & e & -2b-c \\ -2 & 6 & -f \end{bmatrix}$ is skew-symmetric, then AB is

A. $\begin{bmatrix} 4 & -3 & 6 \\ 31 & -54 & 26 \\ 28 & -9 & 50 \end{bmatrix}$

B. $\begin{bmatrix} -4 & -31 & -28 \\ 3 & 54 & 9 \\ -6 & -26 & -50 \end{bmatrix}$

C. $\begin{bmatrix} -4 & 3 & -6 \\ -31 & 54 & -26 \\ -28 & 9 & -50 \end{bmatrix}$

D. $\begin{bmatrix} 4 & 31 & 28 \\ -3 & -54 & -9 \\ 6 & 26 & 50 \end{bmatrix}$

15. If $A = \begin{bmatrix} \cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{bmatrix}$ and $A + A^T = I$, where I is 2×2 unit matrix and A^T is the transpose of A, then the value of θ is equal to

A. $\frac{\pi}{6}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{3\pi}{2}$

16. If $A = \text{diag}(2, -5, 9), B = \text{diag}(1, 1, -4)$, then $A - 2B$ is:

A. $\text{diag}(2, -5, 17)$

B. $\text{diag}(0, -7, 17)$

C. $\text{diag}(7, 0, 17)$

D. $\text{diag}(17, 0, -2)$

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17. If $A = \begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$, then the value of $A + A^2 + A^3 + \ldots A^n =$

A. A

B. nA

C. $(n+1)A$

D. 0

18. If A and B are symmetric matrices of the same order and $X = AB + BA$ and $Y = AB - BA$, then XY^T is equal to

A. XY

B. YX

C. $-XY$

D. None of these

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19. Two farmers Ramkrishnan and Gurcharan Singh cultivates only three varieties of rice namely Basmathi, Permal and Naura. The sale (in Rupees) of these varieties of rice by both the farmers in the month of September and October are given by the following matrices A and B.

September Sales (in Rupees)

$$A = \begin{matrix} \\ \text{Ramakrishnan} \\ \text{Gurucharan Singh} \end{matrix} \begin{bmatrix} \text{Basmathi} & \text{Permal} & \text{Naura} \\ 10,000 & 20,000 & 30,000 \\ 50,000 & 30,000 & 10,000 \end{bmatrix}$$

October Sales (in Rupees)

$$B = \begin{matrix} \\ \text{Ramakrishnan} \\ \text{Gurucharan Singh} \end{matrix} \begin{bmatrix} \text{Basmathi} & \text{Permal} & \text{Naura} \\ 5000 & 10,000 & 6000 \\ 20,000 & 10,000 & 10,000 \end{bmatrix}$$

The combined sales in September and October for each farmer in each variety is

A. $\begin{bmatrix} 36,000 & 30,000 & 36,000 \\ 70,000 & 40,000 & 20,000 \end{bmatrix}$

B. $\begin{bmatrix} 15,000 & 30,000 & 36,000 \\ 35,000 & 40,000 & 20,000 \end{bmatrix}$

C. $\begin{bmatrix} 15,000 & 30,000 & 36,000 \\ 70,000 & 40,000 & 20,000 \end{bmatrix}$

D. $\begin{bmatrix} 35,000 & 40,000 & 360,00 \\ 70,000 & 20,000 & 20,000 \end{bmatrix}$

20. In a certain city there are 30 colleges. Each college has 15 peons, 6 clerks, 1 typist and 1 section officer. The total number of posts of each kind in all the colleges is

A. 600

B. 690

C. 750

D. 700