MATHS

BOOKS - NTA MOCK TESTS

MATRICES AND DETERMINANTS TEST

Mathematics

1. If $A = [(1, -3,), (2, k)]$ and $A^2 - 4A + 10I = A$, then k is equal to

A. 0

B. -4

C. 4

D. 1 or 4

Answer: C

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2. Matrix A is such that $A^2 = 2A - I$, where I is the identity matrix then for $n \geq 2$, A^n

A. $n(A - (n-1)I$

B. $nA - I$

C. $2^{n-1}A(n-1)I$

D. $2^{n-1}A - I$

Answer: A

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3. The system of equations $x + 2y + 3z = 1, 2x + y + 3z = 2$ and $5x + 5y + 9z = 5$ has

A. Unique solution

B. Infinite many solution

C. Inconsistent

D. None of the above

Answer: A

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4. If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & a \\ 4 & b \end{bmatrix}, (A+B)^2 = A^2 + B^2$ Then a and b are respectively

A. $1, -1$

B. $2, -3$

C. $-1, 1$

D. $3, -2$

Answer: A

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5. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is such that $|A| = 0$ and $A^2 - (a+d)A + kI = 0$, thenk is equal to

A. $b + c$

B. $a + d$

C. $ab + cd$

D. Zeo

Answer: D

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6. If $a_1, a_2, a_3, \ldots\ldots\ldots, a_9$ are in H.P and $a_4 = 5, a_5 = 4$, then the value of

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{vmatrix}$$ is

A. $\frac{31}{15}$

B. $\frac{41}{18}$

C. $\frac{50}{21}$

D. $\frac{61}{27}$

Answer: C

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7. A and B are symmetic matrices of the same order. If $X + AB + BA, Y = AB - B$ and $(XY)^T$ is equal to

A. XY

B. YX

C. $-YX$

D. None of these

Answer: C

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8. If $f(x) = x^2 + 4x - 5$ and $A = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$, then f(A) is equal to

A. $\begin{bmatrix} 0 & -4 \\ 8 & 8 \end{bmatrix}$

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

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

D. $\begin{bmatrix} 8 & 4 \\ 8 & 0 \end{bmatrix}$

Answer: D

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9. If the value of a third order determinant is 11, then the value of the square of the determinant formed by the cofactors will be

A. 11

B. 121

C. 1331

D. 14641

Answer: D

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10. If A,B and C are $n \times n$ matrices and $|A| = 2$, $|B| = 3$ and $|C| = 5$ then the valueof the $\left|A^2BC^{-1}\right|$ is equal to

A. $\frac{6}{5}$

B. $\frac{12}{5}$

C. $\frac{18}{5}$

D. $\frac{24}{5}$

Answer: B

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11. If α, β, γ are the roots of $x^3 + px^2 + q = 0$ where $q \neq 0$ then $\Delta = \begin{vmatrix} \frac{1}{\alpha} & \frac{1}{\beta} & \frac{1}{\gamma} \\ \frac{1}{\beta} & \frac{1}{\gamma} & \frac{1}{\alpha} \\ \frac{1}{\gamma} & \frac{1}{\alpha} & \frac{1}{\beta} \end{vmatrix}$ equals

A. $-\frac{p}{q}$

B. $\frac{1}{q}$

C. $\frac{p^2}{q}$

D. None of these

Answer: D

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12. If $O(A) = 2 \times 3, O(B) = 3 \times 2$ and $O(C) = 3 \times 3$ which one of the following is not defined? Where O (A) represents the order of A

A. $BC + A'$

B. BAC

C. $C(A + B')'$

D. $C(A + B')$

Answer: D

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13. The values of λ for which the system of equations

$x + y - 3 = 0$

$(1 + \lambda)x + (2 + \lambda)y - 8 = 0$

$x - (1 + \lambda)y + (2 + \lambda) = 0$ is consistent are

A. $-\frac{5}{3}, 1$

B. $\frac{2}{3}, -3$

C. $-\frac{1}{3}, -3$

D. $0, 1$

Answer: A

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14. Let $D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ &

$D' = \begin{vmatrix} a_1 + pb_1 & b_1 + qc_1 & c_1 + ra_1 \\ a_2 + pb_2 & b_2 + qc_2 & c_2 + ra_2 \\ a_3 + pb_3 & b_3 + qc_3 & c_3 + ra_3 \end{vmatrix}$ then

A. $D' = D(1 + p + q + r)$

B. $D' = D(1 + pqr)$

C. $D' = D$

D. $D' = D(1 - p - q)$

Answer: B

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15. If $2^{a_1}, 2^{a_2}, 2^{a_3} \ldots . .2^{a_r}$ are in geometric progression then

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ a_{n+1} & a_{n+2} & a_{n+3} \\ a_{2n+1} & a_{2n+2} & a_{2n+3} \end{vmatrix} +$$ is equal to

A. 2^5

B. 2^3

C. 0

D. None of these

Answer: C

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16. If the product of the matric

$$B = \begin{bmatrix} 2 & 6 & 4 \\ 1 & 0 & 1 \\ -1 & 1 & -1 \end{bmatrix}$$ with a matrix A has inverse

$C = \begin{bmatrix} -1 & 0 & 1 \\ 1 & 1 & 3 \\ 2 & 0 & 3 \end{bmatrix}$ then A^{-1} equals

A. $\begin{bmatrix} -3 & -5 & 5 \\ 0 & 9 & 14 \\ 2 & 2 & 6 \end{bmatrix}$

B. $\begin{bmatrix} -3 & 5 & 5 \\ 0 & 0 & 9 \\ 2 & 14 & 16 \end{bmatrix}$

C. $\begin{bmatrix} -3 & -5 & -5 \\ 0 & 9 & 2 \\ 2 & 14 & 6 \end{bmatrix}$

D. $\begin{bmatrix} -3 & -3 & -5 \\ 0 & 9 & 2 \\ 2 & 14 & 6 \end{bmatrix}$

Answer: C

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17. Matrix $A = \begin{bmatrix} x & 3 & 2 \\ 1 & y & 4 \\ 2 & 2 & z \end{bmatrix}$. If $xyz = 60$ and $8x + 4y + 3z = 20$, then A(adjA) is equal to

A. $\begin{bmatrix} 64 & 0 & 0 \\ 0 & 64 & 0 \\ 0 & 0 & 64 \end{bmatrix}$

B. $\begin{bmatrix} 88 & 0 & 0 \\ 0 & 88 & 0 \\ 0 & 0 & 88 \end{bmatrix}$

C. $\begin{bmatrix} 68 & 0 & 0 \\ 0 & 68 & 0 \\ 0 & 0 & 68 \end{bmatrix}$

D. $\begin{bmatrix} 34 & 0 & 0 \\ 0 & 34 & 0 \\ 0 & 0 & 34 \end{bmatrix}$

Answer: C

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18. Let A be the set of all 3×3 symmetric matrices all of whose entries are either 0 or 1, five of these entries are 1 and foru of them are zero. Then the number of matrices in A is

A. 3

B. 6

C. 9

D. 12

Answer: D

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19. Let P be a non singular matix such that $I + P + P^2 + \ldots\ldots\ldots + P^n = O$ (Where O denotes the null matrix), then P^{-1} is

A. P^n

B. $-P^n$

C. $-\left(1 + P + P^2 + \ldots\ldots\ldots + P^n\right)$

D. None of these

Answer: A

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20. If $A = \begin{bmatrix} 1 & \frac{1}{2} \\ 0 & 1 \end{bmatrix}$ then A^{64} is

A. $\begin{bmatrix} 1 & 32 \\ 32 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 32 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 32 \\ 0 & 1 \end{bmatrix}$

D. None of these

Answer: C

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21. Let $A = \begin{bmatrix} -1 & 2 & -3 \\ -2 & 0 & 3 \\ 3 & -3 & 1 \end{bmatrix}$ be a matrix then $|A| adj\left(A^{-1}\right)$ is equal to

A. $O_{3\times 3}$

B. $\begin{bmatrix} -1 & 2 & -3 \\ -2 & 0 & 3 \\ 3 & -3 & 1 \end{bmatrix}$

C. I_3

D. $\begin{bmatrix} -3 & -3 & 1 \\ 3 & 0 & -2 \\ -1 & 2 & -3 \end{bmatrix}$

Answer: B

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22. A skew symmetric matrix S satisfies the relation $S^2 + I = 0$, where I is a unit matrix then SS' is

A. I

B. 2I

C. $-I$

D. $-2I$

Answer: A

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23. If $A^2 - A + I = 0$ then the inverse of A is

A. $A + I$

B. A

C. $A - I$

D. $I - A$

Answer: D

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24. If $A = \begin{bmatrix} 2 & 0 & -3 \\ 4 & 3 & 1 \\ -5 & 7 & 2 \end{bmatrix}$ is expressed as the sum of a symmetric and skew symmetic matrix then the symmetric matrix is

A. $\begin{bmatrix} 2 & 4 & -5 \\ 0 & 3 & 7 \\ -3 & 1 & 2 \end{bmatrix}$

B. $\begin{bmatrix} 4 & 4 & -8 \\ 4 & 6 & 8 \\ -8 & 8 & 4 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 2 & -4 \\ 2 & 3 & 4 \\ -4 & 4 & 2 \end{bmatrix}$

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

Answer: C

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25. If A is a matrix such that $A^2 = A + I$. Where I is the unit matrix, then A^5, is equal to

A. $5A + I$

B. $5A + 2I$

C. $5A + 3I$

D. $5A + 4I$

Answer: C

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26. If

$$D = \begin{vmatrix} x^2+x+2 & 2x^2+3x+1 & 3x^2+5x+3 \\ 20x^2+20x+59 & 40x^2+60x+20 & 60x^2+100x+70 \\ 2x^2+2x+6 & 4x^2+6x+2 & 6x^2+0x+7 \end{vmatrix}$$

$= a^2 + bx + c$, then the value of a is

A. $\begin{vmatrix} 1 & 2 & 3 \\ 1 & 0 & 1 \\ 2 & 1 & 1 \end{vmatrix}$

B. $\begin{vmatrix} 1 & 2 & 3 \\ 1 & 1 & 1 \\ 2 & 0 & 1 \end{vmatrix}$

C. $\begin{vmatrix} 1 & 2 & 3 \\ 1 & 0 & 1 \\ 2 & 0 & 1 \end{vmatrix}$

D. $\begin{vmatrix} 1 & 2 & 3 \\ 1 & 0 & 1 \\ 0 & 2 & 1 \end{vmatrix}$

Answer: C

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27. If $A^2 = A$ then $(I + A)^4$ is equal to

A. $I + 15A$

B. $I + 7A$

C. $I + 8A$

D. $I + 11A$

Answer: A

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28. $\Delta = \begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix}$ and $\Delta_1 = \begin{vmatrix} x & a & \\ y & b & q \\ z & c & r \end{vmatrix}$ Then

A. $\Delta = 2\Delta_1$

B. $\Delta = -2\Delta_1$

C. $\Delta = 4\Delta_1$

D. $\Delta = -4\Delta_1$

Answer: A

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29. If α, β, γ are three real numbers such that $\alpha + \beta + \gamma = 0$ then

$\Delta = \begin{vmatrix} 1 & \cos y & \cos \beta \\ \cos y & 1 & \cos \alpha \\ \cos \beta & \cos \alpha & 1 \end{vmatrix}$ equals

A. -1

B. 0

C. 1

D. $\cos\alpha\cos\beta\cos\gamma$

Answer: B

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30. Let $a_2, a_3 \in R$ be such that $|a_2 - a_3| = 6$,

Let $f(x) = \begin{vmatrix} 1 & a_3 & a_2 \\ 1 & a_3 & 2a_2 - x \\ 1 & 2a_3 - x & a_2 \end{vmatrix}, x \in R.$

Then find least value of L such that $f(x) \leq L \forall x \in R$

A. 6

B. 9

C. 12

D. 36

Answer: B

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