MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 36

Mathematics

1. The relation R given by $\{(x, y) : x^2 - 3xy + 2y^2 = 0, \forall x, y \in R\}$ is

A. reflexive but not symmetric

B. symmetric but not transitive

C. symmetric and transitive

D. an equivalence relation

Answer: A

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2. If $I_n - \int (\ln x)^n dx$, then $I_{10} + 10I_9$ is equal to (where C is the constant of integration)

A. $x(\ln x)^{10} + C$

B. $10(\ln x)^9 + C$

C. $9(\ln x)^{10} + C$

D. $x(\ln x)^9 + C$

Answer: A

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3. If p and q are two logical statements, then $p \Rightarrow (q \Rightarrow p)$ is equivalent to

A. $p \Rightarrow (p \Rightarrow q)$

B. $p \Rightarrow (p \vee q)$

C. $p \Rightarrow (p \wedge q)$

D. $p \Rightarrow (p \Leftrightarrow q)$

Answer: B

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4. Let α and β be the roots of the equation $x^2 + ax + 1 = 0, a \neq 0$. Then the equation whose roots are $-\left(\alpha + \frac{1}{\beta}\right)$ and $-\left(\frac{1}{\alpha} + \beta\right)$ is

A. $x^2 = 0$

B. $x^2 - 2ax + 4 = 0$

C. $x^2 - 2ax + 4 = 0$

D. $x^2 - ax + 1 = 0$

Answer: C

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5. The value of the expression $1 + \operatorname{cosec}\frac{\pi}{4} + \operatorname{cosec}\frac{\pi}{8} + \operatorname{cosec}\frac{\pi}{16}$ is equal to

A. $\cot.\ \frac{\pi}{8}$

B. $\cot.\ \frac{\pi}{16}$

C. $\cot.\ \frac{\pi}{32}$

D. $\operatorname{cosec}^2.\ \frac{\pi}{16}$

Answer: C

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6. Let $\vec{p}\, 2\hat{i}+\hat{j}-2\hat{k}, \vec{q}=\hat{i}+\hat{j}$. If $\vec{r}$ is a vector such that $\vec{p}\,.\,Vecr=\left|\vec{r}\right|, \left|\vec{r}-\vec{p}\right|=2\sqrt{2}$ and the angle between $\vec{p}\times\vec{q}$ and $\vec{r}$ is $\frac{\pi}{6}$, then the value of $\left|\left(\vec{p}\times\vec{q}\right)\times\vec{r}\right|$ is equal to

A. $\frac{3}{2}$

B. $\frac{1}{2}$

C. $\frac{3\sqrt{3}}{2}$

D. 3

Answer: A

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7. The solution of the differential equation $x \cos y \frac{dy}{dx} + \sin y = 1$ is (Here, $x > 0$ and λ is an arbitrary constant)

A. $x - x \cos x = lamdba$

B. $x + x \cos x = \lambda$

C. $x - x \sin y = \lambda$

D. $x + x \cos y = \lambda$

Answer: C

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8. Let $|z_1| = 1, |z_2| = 2, |z_3| = 3$ and $z_1 + z_2 + z_3 = 3 + \sqrt{5}i$, then the value of $Re(z_1\overline{z_2} + z_2\overline{z_3} + z_3\overline{z_1})$ is equalto (where z_1, z_2 and z_3 are complex numbers)

A. 1

B. -1

C. $-\frac{1}{2}$

D. 0

Answer: D

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9. If from the top of a tower 80 meters high the angles of depression of the top and bottom of a house are 30° and 45° respectively, then the height of the house is

A. $40\sqrt{3}$ meters

B. $40\left(\frac{\sqrt{3}-1}{\sqrt{3}}\right)$ meters

C. $80\left(\frac{\sqrt{3}-1}{\sqrt{3}}\right)$ meters

D. $40\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$ meters

Answer: C

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10. The radius of circle, touching the parabola $y^2 = 8x$ at (2, 4) and passing through (0, 4), is

A. 1 unit

B. 2 units

C. $\sqrt{2}$ units

D. $\sqrt{3}$ units

Answer: C

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11. Distance between two non - intersecting planes P_1 and P_2 is 5 units, where P_1 is

$2x - 3y + 6z + 26 = 0$ and P_2 is $4x + by + cz + d = 0$. The point $A(-3, 0, -1)$ lies between the planes P_1 and P_2, then the value of $3b + 4c - 5d$ is equal to

A. 580

B. 120

C. -18

D. -120

Answer: B

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12. Let $Z = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 1 & 2 \\ 3 & 1 & 0 \end{bmatrix}$ and $P = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 0 & 1 \end{bmatrix}$. If $Z = PQ^{-1}$, where Q is a square matrix of order 3, then the value of $Tr((adjQ)P)$ is equal to (where $Tr(A)$ represents the trace of a matrix A i.e. the sum of all the diagonal elements of the matrix A and adjB represents the adjoint matrix of matrix B)

A. 3

B. -1

C. 4

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

Answer: B

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13. The sum of 10 terms of the series $1 + 2(1.1) + 3(1.1)^2 + 4(1.1)^3 + \ldots$ is

A. 85.12

B. 92.5

C. 96.5

D. 100

Answer: D

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14. The coefficient of x^4 in the expansion of $\left(1+x+x^2\right)^6$ is

A. 72

B. 90

C. 96

D. 112

Answer: B

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15. The tangent at any point on the curve xy = 4 makes intercepls on the coordinates axes as a and b. Then

the value of ab is

A. 8

B. 16

C. 32

D. 64

Answer: B

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16. The number of ways in which 10 boys can be divied into 2 groups of 5, such that two tallest boys are in two different groups, is equal to

A. 70

B. 35

C. 252

D. 126

Answer: A

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17. The value of $\int_3^6 \frac{\sqrt{(36-x^2)^3}}{x^4} dx$ is equal to

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

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

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

D. $\frac{\pi}{4}$

Answer: C

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18. The line $(K+1)^2x + Ky - 2K^2 - 2 = 0$ passes through the point (m, n) for all real values of K, then

A. $m + n = 2$

B. $m - n = 6$

C. $\frac{m}{n} = 2$

D. $\frac{m}{n} = \frac{1}{2}$

Answer: B

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19. If A and B are non - singular matrices of order 3×3, such that $A = (adjB)$ and $B = (adjA)$, then det $(A) + \det(B)$ is equal to (where $\det(M)$ represents the determinant of matrix M and adj M represents the adjoint matrix of matrix M)

A. 1

B. 2

C. 3

D. 4

Answer: B

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20. Line $L_1 \equiv 3x - 4y + 1 = 0$ touches the cirlces C_1 and C_2. Centres of C_1 and C_2 are $A_2(1, 2)$ and $A_2(3, 1)$ respectively, then identify the INCORRECT statement from the following statements.

A. L_1 is direct common tangent of these circles

B. L_1 is transverse common tangent to these circles

C. Radius of circle C_1 is $\frac{4}{5}$ units

D. Radius of circle C_2 is $\frac{6}{5}$ units

Answer: A

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21. If $\lim_{x \to \infty} \frac{ae^x + b\cos x + c + dx}{x \sin^2 x} = 3$, then the value of $272\frac{abd}{c^3}$ is equal to

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22. A purse contains 10 ten rupee coins and 5 five rupee coins. Two coins are randomly drawn. If the expected value of 2 drawn coins is λ, then $\frac{9\lambda}{4}$ is equal to

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23. If $f(x) = \begin{cases} \frac{(2^x - 1)^2 \tan 3x}{x \sin^2 x}: & 0 < x < \pi/6 \\ \lambda: & x = 0 \end{cases}$ is continuous at x = 0, then the value of $\frac{10\sqrt{3\lambda}}{\ln 2}$ is equal to

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24. If $f: R \to (0, \pi/2]$, $f(x) = \sin^{-1}\left(\frac{40}{x^2 + x + \lambda}\right)$ is a surjective function, then the value of λ is equal to

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25. If $f: R \to R$ is a function defined as $f(x^3) = x^5$, $\forall x \in R - \{0\}$ and $f(x)$ is differentiable $\forall x \in R$, then the value of $\frac{1}{4} f'(27)$ is equal to (here f' represents the derivative of f)

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