MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 77

Mathematics

1. A straight line l_1 with equation $x - 2y + 10 = 0$ meets the circle with equation $x^2 + y^2 = 100$ at B in the first quadrant. A line through B, perpendiclar to l_1 cuts the x - axis and y - axis at P and Q respectively. The area (in sq. units) of the triangle OPQ is (where, O is the origin)

A. 120

B. 150

C. 100

D. 125

Answer: C

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2. Let $L_1 : \frac{x-2}{2} = \frac{y-3}{-1} = \frac{z-1}{3}, L_2 : \frac{x-2}{-1} = \frac{y-3}{3} = \frac{z-1}{\frac{5}{3}}$ and $L_3 : \frac{x-2}{-32} = \frac{y-3}{-19} = \frac{z-1}{15}$ are three lines intersecting each other at the point P and a given plane at A, B, C respectively, such that

$PA = 2, PB = 3, PC = 6$. The volume (in cubic units) of the tetrahedron $PABC$ is

A. 2

B. 18

C. 6

D. 10

Answer: C

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3. The area bounded by $y = ||x| - 1|$ with the x - axis from $x = 0$ to $x = 1$ is k square units, then 4k is equal to

A. 1

B. 2

C. 3

D. 4

Answer: B

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4. If z is a complex number satisfying the equation $|z-(1+i)|^2=2$ and $\omega=\frac{2}{z}$, then the locus traced by $'\omega'$ in the complex plane is

A. $x-y-1=0$

B. $x+y-1=0$

C. $x-y+z=0$

D. $x + 2y + 1 = 0$

Answer: A

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5. The number of ways of arranging 18 boys such that 3 particular boys are always separate is equal to

A. $18! - 16!3!$

B. $16!^{17}P_3$

C. $15!^{16}P_{13}$

D. $17!^{17}P_3$

Answer: C

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6. If $S = \sum_{n=1}^{9999} \frac{1}{\left(\sqrt{n} + \sqrt{n+1}\right)\left(\sqrt[4]{n} + \sqrt[4]{n+1}\right)}$, then the value of S is equal to

A. 9

B. 99

C. 999

D. 9999

Answer: A

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7. Find the number of solution of the equation $\cot^2(\sin x + 3) = 1$ in $[0, 3\pi]$.

A. 2

B. 4

C. 6

D. 8

Answer: C

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8. A special fair cubic die is rolled which has one blue side, two red sides and three yellow sides. The result is the colour of the top side after the die is rolled. If the die is

rolled 8 times, then the probability of blue colour coming at least twice is

A. $\frac{13 \times 5^7}{6^8}$

B. $\frac{6^8 - 13 \times 5^7}{6^8}$

C. $\frac{8 \times 5^7}{6^8}$

D. $1 - \frac{8 \times 5^7}{6^8}$

Answer: B

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9. If the angles between the vectors $\vec{a}$ and $\vec{b}$, $\vec{b}$ and $\vec{c}$, $\vec{c}$ and $\vec{a}$ be $\frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{3}$ respectively, then

the angle which $\vec{a}$ makes with the plane containing $\vec{b}$ and $\vec{c}$ is

A. $\sin^{-1}\sqrt{\frac{\sqrt{2}}{3}}$

B. $\sin^{-1}.\frac{2}{3}$

C. $\sin^{-1}.\frac{1}{4}$

D. $\sin^{-1}\sqrt{\frac{2}{3}}$

Answer: A

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10. The x - intercept of the common tangent to the parabolas $y^2 = 32x$ and $x^2 = 108y$ is

A. -18

B. -12

C. -9

D. -6

Answer: A

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11. Let $A(x) = \begin{bmatrix} 0 & x-2 & x-3 \\ x+2 & 0 & x-5 \\ x+3 & x+5 & 0 \end{bmatrix}$,

then the matrix $A(0)(A(0))^T$ is a

A. null matrix

B. symmetric matrix

C. skew symmetric matrix

D. non singular matrix

Answer: B

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12. Let R = {(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)} be a relation on the set A = {1, 2, 3, 4}. The relation R is

A. Reflexive

B. Transitive

C. Not symmetric

D. A function

Answer: C

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13. The domain of definiton of the function $f(x) = \frac{1}{\sqrt{x^{12} - x^9 + x^4 - x + 1}}$, is

A. $(-\infty, -1)$

B. $(1, \infty)$

C. $(-1, 1)$

D. $(-\infty, \infty)$

Answer: D

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14. If $f(x) = \begin{cases} x^2 & : \text{ when x is rational} \\ 2 - x & : \text{ when x is irrational} \end{cases}$, then

A. $f(x)$ is continuous for all real x

B. $f(x)$ is discontinuous for all real x

C. $f(x)$ is continuous only at $x = 1, -2$

D. $f(x)$ is discontinuous only at $x = 1, -2$

Answer: C

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15. The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 4, then the median of the new set

A. in increased by 4

B. is decreased by 4

C. is two times the original median

D. remains the same as that of the original set

Answer: D

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16. The range of the function $y = 2\sin^{-1}\left[x^2 + \frac{1}{2}\right] + \cos^{-1}\left[x^2 - \frac{1}{2}\right]$ is (where, $[.]$ denotes the greatest integer function)

A. $(0, \pi)$

B. $\left[\pi, \frac{3\pi}{2}\right]$

C. $\{\pi\}$

D. $\left\{\pi, \frac{3\pi}{2}\right\}$

Answer: D

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17. Which of the following functions satisfies all contains of the Rolle's theorem in the invervals specified?

A. $f(x) = x^{\frac{1}{2}}, x \in [-2, 3]$

B. $f(x) = \sin x, x \in \left[-\pi, \frac{\pi}{6}\right]$

C. $f(x) = \ln\left(\frac{x^2 + ab}{x(a+b)}\right), x \in [a, b], 0 < a < b$

D. $f(x) = e^{x^2 - x}, x \in [0, 4]$

Answer: C

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18. Consider the definite integrals $A = \int_0^{\pi} \sin x \cos x^2 x dx$ and $B = \int_0^{\frac{\pi}{2}} \sin x \cos^2 x dx$. Then,

A. $A = 2B$

B. $A = \pi B$

C. $A = \frac{\pi}{2} B$

D. $B = 2A$

Answer: B

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19. If the circle whose diameter is the major axis of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 (a > b > 0)$ meets the minor axis at

point P and the orthocentre of ΔPF_1F_2 lies on the ellipse, where F_1 and F_2 are foci of the ellipse, then the square of the eccentricity of the ellipse is

A. $\frac{\sqrt{5}-1}{2}$

B. $\sqrt{3}-1$

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

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

Answer: A

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20. The equation of the curve satisfying the differential equation $xe^x \sin ydy - (x+1)e^x \cos ydx = ydy$ and

passing through the origin is

A. $xe^x = y^2 \cos y$

B. $2xe^x = y \cos y$

C. $2xe^x \cos y + y^2 = 0$

D. $2xe^x \cos y = y^2$

Answer: C

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21. Let $\sqrt{a} + \sqrt{d} = \sqrt{c} + \sqrt{b}$ and $ad = bc$, where $a, b, c, \in R^+$. If the family of lines $\left(a^2x + b^2y + c^2\right) + d^2x = 0$ passes through a fixed point (x_0, y_0), then the value of $(x_0 + y_0)$ is

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22. If $\left(1+x+x^2\right)^8 = a_0 + a_1 x + a_2 x^2 + \ldots a_{16} x^{16}$ for all values of x, then $\frac{a_5}{100}$ is equal to

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23. The value of $\lim_{x \to 0} \frac{1-\cos^3 x}{\sin^2 x \cos x}$ is equal to

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24. The integral $I = \int \frac{e^{\sqrt{x}} \cos\left(e^{\sqrt{x}}\right)}{\sqrt{x}} dx = f(x) + c$ (where, c is the constant of integration) and

$f\left(\ln\left(\frac{\pi}{4}\right)\right)^2 = \sqrt{2}$. Then, the number of solutions of $f(x) = 2e(\forall x \in R - \{0\})$ is equal to

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25. Let $A = \begin{bmatrix} 1 & 3\cos 2\theta & 1 \\ \sin 2\theta & 1 & 3\cos 2\theta \\ 1 & \sin 2\theta & 1 \end{bmatrix}$ the maximum value of $|A|$ is equal to k, then $(k-3)^2$ is equal to

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