MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 85

Mathematics

1. The area (in sq. units) of the locus of the point at which the two circles $x^2+y^2=1$ and $(x-4)^2+y^2=4$ subtend equal angles is

A. $(32/9)\pi$

B. $(32/3)\pi$

C. $(64/3)\pi$

D. $(64/9)\pi$

Answer: D

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2. The value of the integral $I = \int_0^{\pi} \frac{x}{1+\tan^6 x} dx$, ($x$ not equal to $\frac{\pi}{2}$) is equal to

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

B. $\frac{\pi^2}{4}$

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

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

Answer: B

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3. Let form a point $A(h, k)$ chords of contact are drawn to the ellipse $x^2 + 2y^2 = 6$ where all these chords touch the ellipse $x^2 + 4y^2 = 4$. Then, the perimeter (in units) of the locus of point A is

A. 2π

B. 3π

C. 4π

D. 6π

Answer: D

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4. If the origin and the non - real roots of the equation $3z^2 + 3z + \lambda = 0, \forall \lambda \in R$ are the vertices of an equilateral triangle in the argand plane, then $\sqrt{3}$ times the length of the triangle is

A. 2 units

B. 1 units

C. 3 units

D. 4 units

Answer: B

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5. The area bounded by $y = \frac{1}{x}$ and $y = \frac{1}{2x - 1}$ from x = 1 to x = 2 is ln (a) sq. units, then $3a^2$ is equal to

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

B. 4

C. 1

D. $\frac{1}{4}$

Answer: B

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6. The point of intersection of the tangent to the parabola $y^2 = 4x$ which also touches $x^2 + y^2 = \frac{1}{2}$ is

A. $(-1, 0)$

B. $\left(-\frac{1}{2}, 0\right)$

C. $(-2, 0)$

D. $\left(\frac{-3}{2}, 0\right)$

Answer: A

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7. The solution of the differential equation $\frac{dy}{dx} = \frac{x-y}{x-3y}$ is (where, c is an arbitrary constant)

A. $2xy = x^2 + 3y + c$

B. $xy = x^2 + y^2 + c$

C. $2xy = x^2 + 3y^2 + c$

D. $xy = x^2 + x$

Answer: C

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8. The integral $I = \int \left[xe^{x^2}\left(\sin x^2 + \cos x^2\right)\right] dx = f(x) + c$, (where, c is the constant of integration). Then, f(x) can be

A. $e^x \sin\left(x^2\right)$

B. $e^{x^2} \sin(x)$

C. $e^{x^2}\left(\frac{x^2}{2}\right)$

D. $\frac{1}{2}e^{x^2} \sin\left(x^2\right)$

Answer: D

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9. If $\vec{a}$ and $\vec{b}$ are unit vectors making an angle α with each other, such that $\alpha \in (0, \pi)$ and $\left|\vec{a} + 2\vec{b}\right| < 5$, then α lies in the interval

A. $(0, \pi)$

B. $\left(0, \frac{\pi}{2}\right)$

C. $\left(\frac{\pi}{2}, \frac{2\pi}{3}\right)$

D. $\left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$

Answer: A

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10. If A and B are two matrices of order 3×3 satisfying $AB = A$ and $BA = B$, then $(A+B)^5$ is equal to

A. $5(A+B)$

B. $5I$

C. $16(A+B)$

D. $32I$

Answer: D

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11. Consider the line $L: \dfrac{x-1}{2} = \dfrac{y-1}{-3} = \dfrac{z+10}{8}$ and a family of planes P containing the line L. The member of the family of planes P which is situated at a maximum distance from $A(1, 0, 0)$ will be

A. $x - 2y - z = 13$

B. $x + 2y - z = 7$

C. $2x + y - z = 7$

D. $x + 2y - 2z = 13$

Answer: A

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12. A purse contains three 10 paise, three 50 paise and ten 1 rupee coins. If three coins are selected at random, then the probability that the total amount is 2 rupee is

A. $\frac{2}{5}$

B. $\frac{3}{56}$

C. $\frac{1}{4}$

D. $\frac{1}{8}$

Answer: B

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13. The number of solutions to $x+y+z=10$, where $1 \leq x, y, z \leq 6$ and $x, y, z \in N$, is equal to

A. 35

B. 36

C. 27

D. 66

Answer: C

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14. The number of values of the parameter $\alpha \in [0, 2\pi]$ for which the quadratic function $(\sin\alpha)x^2 + (2\cos\alpha)x + \frac{1}{2}(\cos\alpha + \sin\alpha)$ is the square of a linear funcion is

A. 2

B. 4

C. 6

D. 8

Answer: B

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15. The value of $\lim_{x \to 1^-} \frac{\sqrt{\pi} - \sqrt{4 \tan^{-1} x}}{\sqrt{1-x}}$ is equal to

A. $\sqrt{\pi}$

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

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

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

Answer: D

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16. Three positive acute angles α, β and γ satisfy the relation

$$\tan.\frac{\beta}{2} = \frac{1}{3}\cot.\frac{\alpha}{2} \text{ and } \cot.\frac{\gamma}{2} = \frac{1}{2}\left(3\tan.\frac{\alpha}{2} + \cot.\frac{\alpha}{2}\right)$$

. Then, the value of $\alpha + \beta + \gamma$ is equal to

A. π

B. 2π

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

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

Answer: A

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17. If $p, q, r, s \in R,$ then equaton

$$\left(x^2 + px + 3q\right)\left(-x^2 + rx + q\right)\left(-x^2 + sx - 2q\right) = 0$$

has

A. 6 real roots

B. at least two real roots

C. 2 real and 4 imaginary roots

D. 4 real and 2 imaginary roots

Answer: B

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18. Let $f: R \to R$ be a function defined as

$$f(x) = \begin{cases} 5 & \text{if } x \le 1 \\ a + bx & \text{if } 1 < x < 3 \\ b + 5x & \text{if } 3 \le x < 3 \\ 30 & \text{if } x \ge 5 \end{cases}$$ Then f is :

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19. If $S_n = n^2 a + \frac{n}{4}(n-1)d$ is the sum of the first n terms of an arithmetic progression, then the common difference is

A. $a + 2d$

B. $2a + d$

C. $\frac{a+d}{2}$

D. $2a + \frac{d}{2}$

Answer: D

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20. Which of the statements is not a fallacy?

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

B. $\sim((p \wedge \sim q) \Rightarrow p)$

C. $\sim(p \Rightarrow (p \vee \sim q))$

D. $\sim p \vee (\sim p \Rightarrow \sim q)$

Answer: D

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21. The product of all the values of $|\lambda|$, such that the lines

$x+2y-3=0, 3x-y-1=0$ and $\lambda x+y-2=0$

cannot form a triangle, is equal to

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22. Let

$f(x)=2\tan^3 x-6\tan^2 x+1+sgn(e^x), \forall x\in\left[-\frac{\pi}{4},\frac{\pi}{4}\right],$

Then the positive difference between the least value and the local maximum value of the function is (where sgn (f(x)) represents the signum function)

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23. Let $|A| = |a_{ij}|_{3 \times 3} \neq 0$ Each element a_{ij} is multiplied by by k^{i-j} Let $|B|$ the resulting determinant, where $k_1|A| + k_2|B| = a$ then $k_1 + k_2 =$

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24. If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots\ldots\ldots + C_nx^n \, \forall n \in N$ and

$$\frac{C_0^2}{1} + \frac{C_1^2}{2} + \frac{C_2^2}{3} + \ldots\ldots\ldots + \frac{C_n^2}{n+1} = \frac{\lambda(2n+1)!}{((n+1)!)^2},$$

then the vlaue of λ is equal to

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25. The tops of two poles of height 40 m and 25 m are connected by a wire of length $\frac{30\sqrt{2}}{\left(\sqrt{3}-1\right)}m$. If the wire makes an angle α with the horizontal, then the value of $\sqrt{2}\sin\alpha$ is equal to $\left(\text{take}, \ \sqrt{3}=1.7\right)$

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