MATHS

NTA MOCK TESTS ENGLISH

NTA JEE MOCK TEST 75

Mathematics

1. Let P is a point on the line $y + 2x = 2$ and Q and R are two points on the line $3y + 6x = 3$. If the triangle PQR is an equilateral triangle, then its area (in sq. units) is equal to

A. $\frac{1}{15}$

B. $\frac{1}{5\sqrt{3}}$

C. $\frac{1}{3\sqrt{5}}$

D. $\frac{1}{2\sqrt{15}}$

Answer: B

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2. Let O be an interior point of triangle ABC, such that $2\overrightarrow{OA} + 3\overrightarrow{OB} + 4\overrightarrow{OC} = 0$, then the ratio of the area of ΔABC to the area of ΔAOC is

A. $3:1$

B. $3:2$

C. $2:1$

D. $4:3$

Answer: A

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3. Let α, β, γ be three real numbers satisfying $[\alpha \quad \beta \quad \gamma]\begin{bmatrix} 2 & -1 & 1 \\ -1 & -1 & -2 \\ -1 & 2 & 1 \end{bmatrix} = [0 \quad 0 \quad 0]$. If the point $A(\alpha, \beta, \gamma)$ lies on the plane $2x + y + 3z = 2$, then $3\alpha + 3\beta - 6\gamma$ is equal to

A. 0

B. $-\frac{1}{3}$

C. 1

D. -3

Answer: A

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4. If the tangent to the ellipse $x^2 + 4y^2 = 16$ at the point P(theta) is a normal to the circle $x^2 + y^2 - 8x - 4y = 0$, then theta equals

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

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

C. $\frac{5\pi}{2}$

D. $\frac{7\pi}{4}$

Answer: A

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5. The solution of the differential equation $\left(3\sin^2 x\cos x\right)y^2dx + 2y\sin^3 xdy = \sin xdx$ (where, C is an arbitrary constant)

A. $2y^2\sin x = \cos x + C$

B. $y^2\sin^3 x + \cos x = C$

C. $y^3\sin^2 x + \sin x = C$

D. $y\sin x = \cos^2 x + C$

Answer: B

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6. The smallest positive integral value of a, such that the function $f(x) = x^4 - 4ax^2 + 10$ has more two local extrema, is

A. 1

B. 2

C. 4

D. 16

Answer: A

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7. The value of $\Sigma_{i=1}^{n}\left(.^{n+1}C_i - .^{n}C_i\right)$ is equal to

A. 2^n

B. $2^n + 1$

C. 3.2^n

D. $2^n - 1$

Answer: D

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8. If the integral $\int_0^2 \frac{dx}{\sin x + \sin(2-x)} = A$, then the integral $\beta = \int_0^2 \frac{xdx}{\sin x + \sin(2-x)}$ is equal to

A. $(\sin 2)A$

B. 2A

C. A

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

Answer: C

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9. If the reciprocals of 2, $\log_{(3^x-4)} 4$ and $\log_{3^x+\frac{7}{2}} 4$ are in arithmetic progression, then x is equal to

A. 1

B. 2

C. 4

D. 0

Answer: B

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10. From point P(4,0) tangents PA and PB are drawn to the circle $S: x^2 + y^2 = 4$. If point Q lies on the circle, then maximum area of $\triangle QAB$ is- (1) $2\sqrt{3}$ (2) $3\sqrt{3}$ (3) $4\sqrt{3}$ A) 9

A. 12

B. 27

C. 48

D. 45

Answer: B

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11. Consider a plane $P: 2x + y - z = 5$, a line $L: \frac{x-3}{2} = \frac{y+1}{-3} = \frac{z-2}{-1}$ and a point $A(3, -4, 1)$. If the line L intersects plane P at B and the xy plane at C, then the area (in sq. units) of ΔABC is

A. $\sqrt{7}$

B. $\sqrt{8}$

C. $\sqrt{10}$

D. $2\sqrt{3}$

Answer: C

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12. The number of triplets (a, b, c) of positive integers satisfying the equation $\begin{vmatrix} a^3+1 & a^2b & a^2c \\ ab^2 & b^3+1 & b^2c \\ ac^2 & bc^2 & c^3+1 \end{vmatrix} = 30$ is equal to

A. 3

B. 6

C. 9

D. 12

Answer: A

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13. The locus of the trisection point of any arbitrary double ordinate of the parabola $x^2 = 4y$, is

A. $9x^2 = y$

B. $3x^2 = 2y$

C. $9x^2 = 4y$

D. $9x^2 = 2y$

Answer: C

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14. If

$A = \{1, 3, 5, 7, 9, 11, 13, 15, 17\}, B = \{2, 4, \ldots\ldots, 18\}$ and N

the set of natural numbers is the universal set, then $A' \cup \{(A \cup B) \cap B'\}$ is (a) ϕ (b)N (c) A (d) B

A. A

B. N

C. B

D. None of these

Answer: B

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15. Let $f:(6,8) \to (9,11)$ be a function defined as $f(x) = x + \left[\frac{x}{2}\right]$ (where $[.]$ denotes the greatest integer function), then $f^{-1}(x)$ is equal to

A. $x - \left[\frac{x}{2}\right]$

B. $-x - 3$

C. $x - 3$

D. $\frac{1}{x + \left[\frac{x}{2}\right]}$

Answer: C

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16. Let $f(x+y) = f(x)f(y)$ for all $x, y \varepsilon R$ and $f(x) = 1 + x\phi(x)ln2$ where $\lim_{x \to 0} \phi(x) = 1$ then $f, (x)$ is

A. f(x)

B. [f(x)]^(2)`

C. $g(x)$

D. None of these

Answer: A

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17. If the standard deviation of the numbers 2, 3, a and 11 is 3.5, then which of the following is true ?

(1) $3a^2 - 26a + 55 = 0$

(2) $3a^2 - 32a + 84 = 0$

(3) $3a^2 - 34a + 91 = 0$

(4) $3a^2 - 23a + 44 = 0$

A. $3a^2 - 23a + 24 = 0$

B. $3a^2 - 26a + 46 = 0$

C. $3a^2 - 32a + 28 = 0$

D. $3a^2 - 34a + 45 = 0$

Answer: C

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18. The domain of the function $f(x) = 4\sqrt{\cos^{-1}\left(\frac{1-|x|}{2}\right)}$ is

A. $(-\infty, -3) \cup (3, \infty)$

B. $[-3, 3]$

C. $(-\infty, -3] \cup [3, \infty)$

D. ϕ

Answer: B

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19. The integral $I = \int \sec^3 x \tan^3 x dx$ is equal to (where, C is the constant of integration)

A. $\sec^5 x - \sec^3 x + C$

B. $\frac{\sec^5 x}{5} - \sec^3 x + C$

C. $\frac{\sec^5 x}{5} - \frac{\sec^3 x}{3} + C$

D. $\frac{\sec^5 x}{5} - \tan^{-1} x + C$

Answer: C

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20. If ω is the imaginary cube roots of unity, then the number of pair of integers (a,b) such that $|a\omega + b| = 1$ is _____.

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21. If $\sqrt{3}\sin x + \cos x - 2 = (y-1)^2$ for $0 \leq x \leq 8\pi$, then the number of values of the pair (x, y) is equal to

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22. The probability that a married man watches a certain T.V. show is 0.6 and the probability that a married woman

watches the show is 0.5. The probability that a man watches the show given that his wife does watch is 0.8. If the probability that a wife watches the show given that her husband does watch is k, then $\frac{1}{k}$ is equal to

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23. The value of $\lim_{x \to 1} \Sigma_{r=1}^{10} = \frac{x^r - 1^r}{2(x-1)}$ is equal to

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