MATHS

BOOKS - NTA MOCK TESTS

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 0 sanormal to the circle $x^2 + y^2 - 8x - 4y = 0$ then θ is equal to

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 $A = \{1, 3, 5, 7, 9, 11, 13, 15\}$, B and $N = \{2, 4, \ldots\ldots, 16\}$ is the universal set, then $A' \cup ((A \cup B) \cap B')$ is (where, N is the set of natural numbers)

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 $x, y \in R$ and $f(x)=1+x\phi(x)\log 3$. If $\lim_{x \to 0} \phi(x)=1$, then f'(x) is equal to

A. $\log 3^{f(x)}$

B. $\log[f(x)]^3$

C. $\log 3$

D. None of these

Answer: A

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17. If the standard deviation of the numbers 2, 4, a and 10 is 3.5, then which of the following is true?

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. A word has 4 identical letters and rest all are distinct letters. If the total number of words that can be made with the letters of the word be 210, then the total number of different letters in the word is equal to

A. 3

B. 5

C. 4

D. 7

Answer: C

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20. 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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21. 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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22. If the area bounded by $y + |x - \pi| \leq \pi$ and $y \geq \frac{\pi}{2}$ is $K\pi^2$ sq. units, then the value of 8K is equal to

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23. 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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24. 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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25. 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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