MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 106

Mathematics

1. The value of the integral $\int_0^4 \{x^3 - 6x^2 + 12x - 4 + (x-2)\cos(x-2)\}dx$ is equal to

A. 12

B. 16

C. 0

D. 10

Answer: B

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2. Let $a, \lambda, \mu \in R,$ Consider the system of linear equations $ax + 2y = \lambda 3x - 2y = \mu$ Which of the flollowing statement (s) is (are) correct?

A. If $a = -3$, then the system has infinitely many solutions for all values of λ and μ

B. If $a \neq -3$, then the system has a unique solution for all values of λ and μ

C. If $\lambda + \mu = 0$, then the system has infinitely many solution for $a = -3$

D. IF $\lambda + \mu \neq 0$, then the system has no solution for $a = -3$

Answer:

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3. Consider the statement p : If a cylinder is right circular cylinder then its volume is $\frac{1}{3}\pi r^2 h$.

Contrapositive of the statement p is

A. If the volume of a cylinder is $\frac{1}{3}\pi r^2 h$ then it is not right circular cylinder

B. If the volume of a cylinder is not $\frac{1}{3}\pi r^2 h$ then it is not right circular cylinder

C. If the volume of a cylinder is not $\frac{1}{3}\pi r^2 h$ then it is not right circular cylinder

D. If a cylinder is not right circular cylinder then its volume is not $\frac{1}{3}\pi r^2 h$

Answer: B

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4. Find the value of $\sin^{-1}\left(\cos\left(\sin^{-1}x\right)\right)+\cos^{-1}\left(\sin\left(\cos^{-1}x\right)\right)$

A. 0

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

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

D. $\frac{3\pi}{4}$

Answer: C

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5. Let $\int\frac{10\ln x}{x^2}dx=f(x)$, for all positive x. If $f(e)=\frac{1}{e}$, then $f(2)+f(4)$ is equal to

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6. If $f(x)=x^2+\frac{x^2}{1+x^2}+\frac{x^2}{\left(1+x^2\right)^2}+\ldots\ldots$ upto, ∞, then

A. $\lim_{x \to 0} f(x)$ does not exist

B. $f(x)$ is continuous but not differentiable at x = 0

C. f(x) is discontinuous at x = 0

D. f(x) is differentiable at x = 0

Answer: C

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7. The area (in square units) bounded by$y = x^2 + x + 1$ and $x + y = 2$ is

A. $2\sqrt{2}$

B. $\frac{4\sqrt{2}}{3}$

C. $\frac{8\sqrt{2}}{3}$

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

Answer: C

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8. Suppose $\cos^2 y.\frac{dy}{dx} = \sin(x+y) + \sin(x-y), |x| \leq \frac{\pi}{2}$ and $|y| \leq \frac{\pi}{2}$. If $y\left(\frac{\pi}{3}\right) = -\frac{\pi}{2}$, then $y\left(\frac{\pi}{2}\right)$ is

A. 0

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

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

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

Answer: A

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9. If $(1!)^2 + (2!)^2 + (3!)^2 + \ldots\ldots\ldots + (99!)^2$ is divided by 100, the remainder is

A. 27

B. 28

C. 17

D. 14

Answer: C

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10. If a number of ellipse whose major axis is x - axis and the minor axis is y - axis be described having the same length of the major axis as 2a but a variable minor axis, then the tangents at the ends of their latus rectum pass through fixed points whose distance from the centre is equal to

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

B. 1 unit

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

D. 2 units

Answer: B

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11. Find the set of all values of a for which the roots of the equation $x^2 - 2ax + a^2 + a - 3 = 0$ are less than 3,

A. $a < 2$

B. $2 \leq a \leq 3$

C. $3 < a \leq 4$

D. $a > 4$

Answer: A

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12. Let

$F(x) = \left(1 + \sin\left(\frac{\pi}{2k}\right)\right)\left(1 + \sin(k-1)\frac{\pi}{2k}\right)\left(1 + \sin(2k+1)\frac{\pi}{2k}\right)\left(1 + \sin$

. The value of $F(1) + F(2) + F(3)$ is equal to

A. $\frac{3}{16}$

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

C. $\frac{5}{16}$

D. $\frac{7}{16}$

Answer: D

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13. Number of solutions of the equation $\sin^4 x - \cos^2 x \sin x + 2\sin^2 x + \sin x = 0 \in 0 \leq x \leq 3\pi$ is____

A. $\frac{3\pi}{4}$

B. 2π

C. 4π

D. 6π

Answer: D

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14. Let $\vec{a} = (\cos\theta)\hat{i} - (\sin\theta)\hat{j}$, $\vec{b} = (\sin\theta)\hat{i} + (\cos\theta)\hat{j}$, $\vec{c} = \hat{k}$ and $\vec{r} = 7\hat{i} +$. IF $\vec{r} = x\vec{a} + y\vec{b} + z\vec{c}$, then the value of $\frac{x^2 + y^2}{z}$ is equal to

A. 3

B. 5

C. 50

D. 7

Answer: B

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15. Two numbers are selected randomly from the set $S = \{1, 2, 3, 4, 5, 6\}$ without replacement one by one. The probability that minimum of the two numbers is less than 4 is

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

B. $\frac{14}{15}$

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

D. $\frac{4}{5}$

Answer: D

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16. A line is drawn from the point $P(1, 1, 1)$ and perpendicular to a line with direction ratio $(1, 1, 1)$ to intersect the plane $x + 2y + 3z = 4$ at Q. The locus of point Q is :

A. $\frac{x}{1} = \frac{y-5}{-2} = \frac{z+2}{1}$

B. $\frac{x}{-2} = \frac{y-5}{1} = \frac{z+2}{1}$

C. $x = y = z$

D. $\frac{x}{2} = \frac{y}{3} = \frac{2}{5}$

Answer: A

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17. If α, β, γ are the roots of $px^2 + qx^2 + r = 0,$ then the value of the determinant $|\alpha\beta\beta\gamma\gamma\alpha\beta\gamma\gamma\alpha\alpha\beta\gamma\alpha\alpha\beta\beta\gamma|$ is p b. q c. 0 d. r

A. pq

B. qr

C. 0

D. pr

Answer: C

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18. If $f(x) = \sin^{-1}\frac{2\cdot(3)^x}{1+9^x}$, then $f'\left(-\frac{1}{2}\right)$ is equal to

A. $\sqrt{3}\log_e\sqrt{3}$

B. $-\sqrt{3}\log_e\sqrt{3}$

C. $-\sqrt{3}\log_e 3$

D. $\sqrt{3}\log_e 3$

Answer: A

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19. The line $2x - y + 1 = 0$ is tangent to the circle at the point (2, 5) and the centre of the circle lies on $x - 2y = 4$. The square of the radius of the circle is

A. 45

B. 75

C. 20

D. 50

Answer: A

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20. The number of ways in which four different letters can be put in their four addressed envelopes such that atleast two of them are in the wrong envelopes are

A. 23

B. 25

C. 6

D. 7

Answer: A

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21. The maximum number of points on the parabola $y^2 = 16x$ which re equidistant from a variable point P (which lie inside the parabola) are

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22. The slope of the tangent to the curve $y = x^3 + x + 54$ which also passes through the originis

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23. In an arithmetic progression containing 99 terms, then sum of all the odd numbered terms, the sum of all the odd numbered terms is 2550. If the sum of all the 99 terms of the arithmetic progression is k, then $\frac{k}{100}$ is equal to

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24. Consider the system of equations $ax + y + bz = 0, bx + y + az = 0$ and $ax + by + abz = 0$ where $a, b \in \{0, 1, 2, 3, 4\}$. The number of ordered pairs (a, b) for which the system has non - trivial solutions is

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25. Let $A(z_1), B(z_2)$ and $C(z_3)$ be complex numbers satisfying the equation $|z| = 1$ and also satisfying the relation $3z_1 = 2z_2 + 2z_3$. Then $|z_2 - z_3|^2$ is equal to

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