MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 86

Mathematics

1. The coefficient of x^{n-2} in the polynomial $(x-1)(x-2)(x-3)...(x-n)$ is

A. $\frac{n(n^2+2)(3n+1)}{24}$

B. $\frac{n(n^2-1)(3n+2)}{24}$

C. $\frac{n(n^2+1)(3n+4)}{24}$

D. $\frac{n(n^2-2)(3n-2)}{24}$

Answer: B

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2. The number of ways in which three numbers in arithmetic progression can be selected from $\{1, 2, 3, \ldots\ldots\ldots, 50\}$ is

A. 276

B. 600

C. 840

D. 640

Answer: B

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3. If $a > 2$, then the roots of the equation $(2 - a)x^2 + 3ax - 1 = 0$ are

A. one positive and one negative

B. both negative

C. both positive

D. both imaginary

Answer: C

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4. If $\sin 2\beta$ is the geometric mean between $\sin\alpha$ and $\cos\alpha$, then $\cos 4\beta$ is equal to

A. $2\sin^2\left(\frac{\pi}{4}-\alpha\right)$

B. $2\cos^2\left(\frac{\pi}{4}-\alpha\right)$

C. $2\cos^2\left(\frac{\pi}{2}+\alpha\right)$

D. $2\sin^2\left(\frac{\pi}{4}+\alpha\right)$

Answer: A

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5. In the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ the equation $\log_{\sin\theta}(\cos 2\theta) = 2$ has

A. no solution

B. a unique solution

C. two solutions

D. infinite many solutions

Answer: B

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6. A line passing through the point (2, 2) encloses an area of 4 sq. units with coordinate axes. The sum of intercepts made by the line on the x and y axis is equal to

A. 1

B. $2\sqrt{2}$

C. $\sqrt{2}$

D. 2

Answer: C

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7. The angle between the chords of the circle $x^2 + y^2 = 100$, which passes through the point (7,1) and also divides the circumference of the circle into two arcs whose length are in the ratio 2 : 1, is equal to

A. $\frac{7}{12}$

B. $\frac{12}{-7}$

C. $\frac{-7}{12}$

D. $\frac{-12}{7}$

Answer: A

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8. Let the focus S of the parabola $y^2 = 8x$ lie on the focal chord PQ of the same parabola. If the length QS = 3 units, then the ratio of length PQ to the length of the laturs rectum of the parabola is

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

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

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

D. $\frac{9}{8}$

Answer: D

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9. If the tangents PQ and PR are drawn from a variable point P to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, such that the fourth point S of the parallelogram

PQSR lies on the circumcircle of the ΔPQR, then the area (in sq. units) of the locus of P is

A. 7π

B. 16π

C. 25π

D. 9π

Answer: C

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10. Let $f(x) = \begin{cases} \max\{|x|, x^2\} & |x| \leq 3 \\ 12 - |x| & 3 < |x| \leq 12 \end{cases}$. If S is the set of points in the interval $(-12, 12)$ at which f is not differentiable, then S is

A. equal to $\{-3, 3\}$

B. equal to $\{-3, -1, 1, 3\}$

C. an empty set

D. equal to $\{-3, -1, 0, 1, 3\}$

Answer: D

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11. Let a function $f:(0,\infty)\to[0,\infty)$ be defined by $f(x)=\left|1-\frac{1}{x}\right|$. Then f is

A. injective but not surjective

B. both injective as well as surjective

C. not injective but it is surjective

D. neiher injective nor surjective

Answer: B

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12. The logical statement $[\sim(\sim p \vee q) \vee (p \wedge r)] \wedge (\sim q \wedge r)$ is equivalent to

(a) $(\sim p \wedge \sim q) \wedge r$ (b) $\sim p \vee r$ (c) $(p \wedge r) \wedge \sim q$ (d) $(p \wedge \sim q) \vee r$

A. $(p \wedge q) \vee r$

B. $\sim p \vee r$

C. $(\sim p \wedge q) \wedge r$

D. $(p \wedge r) \wedge \sim q$

Answer: D

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13. A flagstaff stands vertically on a pillar, the height of the flagstaff being double the height of the pillar. A man on the ground at a distance finds that both the pillar and the flagstaff subtend equal angles at his eyes. The ratio of the height of the pillar and the distance of the man from the pillar is

A. $\sqrt{3}:1$

B. $1:\sqrt{3}$

C. $2:\sqrt{3}$

D. $1:\sqrt{2}$

Answer: D

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14. The function $f(x) = e^{\sin x + \cos x}\ \forall x \in [0, 2\pi]$ attains local extrema at $x = \alpha$ and $x = \beta$, then $\alpha + \beta$ is equal to

A. π

B. 2π

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

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

Answer: C

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15. If $I = \int \frac{dx}{x^2 - 2x + 5} = \frac{1}{2}\tan^{-1}(f(x)) + C$ (where, C is the constant of integration) and $f(2) = \frac{1}{2}$, then the maximum value of $y = f(\sin x)\, \forall x \in R$ is

A. 4

B. 2

C. 0

D. -1

Answer: C

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16. If the curve satisfying differential equation $xdy = \left(y + x^3\right)dx$ passes through $(1, 1)$, then the equation to the curve is

A. $y^2 = x^3 - x$

B. $y = x^2 - x$

C. $2y = x^3$

D. $2y = x^3 + x$

Answer: D

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17. If the system of equations $(.^n C_3)x + (.^n C_4)y + 35z = 0, (.^n C_4)x + 35y + (.^n C_3)z = 0$ and $35x +$ has a non - trivial solution, then the value of n is equal to $(\forall n \in N, n \geq 4)$

A. 6

B. 7

C. 8

D. 9

Answer: B

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18. A box contains 3 coins B_1, B_2, B_3 and the probability of getting heads on the coins are $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$ respectively. If one of the coins is selected at random and tossed for 3 times and exactly 3 times and exactly 3 heads appeared, then the probability that it was coin B_1 is

A. $\frac{9}{73}$

B. $\frac{10}{73}$

C. $\frac{36}{73}$

D. $\frac{64}{73}$

Answer: D

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19. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} p & q \\ r & s \end{bmatrix}$ are two matrices such that AB = BA and $r \neq 0$, then the value of $\frac{3p - 3s}{5q - 4r}$ is equal to

A. $\frac{3}{2}$

B. 4

C. $\frac{9}{2}$

D. 5

Answer: C

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20. If a line passing through $(-2, 1, \alpha)$ and (4, 1, 2) is perpendicular to the vector $3\hat{i} - 4\hat{j} + 5\hat{k}$ and parallel to the plane containing vectors $\hat{i} + 2\beta\hat{k}$ and $2\beta\hat{i} + \alpha\hat{k}(\forall \beta \neq 0)$, then $10(\alpha + \beta)$ is equal to

A. 53

B. 54

C. 55

D. 56

Answer: A

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21. If $(1^2 - a_1) + (2^2 - a_2) + (3^2 - a_3) + \ldots . + (n^2 - a_n) = \frac{1}{3}n(n^2 - 1)$, then the value of a_7 is

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22. If $Im\left(\frac{iz + 2}{z + i}\right) = -1$ represents part of a circle with radius r units, then the value of $4r^2$ is (where, $z \in C, z \neq i, lm(z)$ represents the imaginary part of z and $i^2 = -1$)

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23. For a sample size of 10 observations $x_1, x_2, \ldots\ldots x_{10}$, if $\Sigma_{i=1}^{10}(x_i - 5)^2 = 350$ and $\Sigma_{i=1}^{10}(x_i - 2) = 60$, then the variance of x_i is

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24. If $\int_0^{\pi/4} \left[\sqrt{\tan x} + \sqrt{\cot x}\right] dx = \frac{\pi}{\sqrt{m}}$, then the value of m is equal to

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25. A line $\frac{x-a}{2} = \frac{y-b}{3} = \frac{z-c}{4}$ intersects a plane $x - y + z = 4$ at a point where the line $\frac{x-1}{2} = \frac{y+3}{5} = \frac{z+1}{2}$ meets the plane. Also, a plane $ax - 2y + bz = 3$ meet them at the same point, them $11(a + b + c)$ is equal to

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