MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 95

Mathematics

1. 5 boys & 4 girls sit in a straight line. Find the number of ways in which they can be seated if 2 girls aretogether & the other 2 are also together but separate from the first 2.:

A. 5400

B. 10800

C. 21600

D. 43200

Answer: D

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2. Let A and B are two non - singular matrices such that $AB = BA^2, B^4 = I$ and $A^k = I$, then k can be equal to

A. 5

B. 10

C. 15

D. 16

Answer: C

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3. If $g(x)$ is a differentiable function such that $\int_1^{\sin\alpha} x^2 g(x)dx = (\sin\alpha - 1),\ \forall\alpha \in \left(0, \frac{\pi}{2}\right)$, then the value of $g\left(\frac{1}{3}\right)$ is equal to

A. 4

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

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

D. 9

Answer: D

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4. Let $f(\theta) = \dfrac{1}{1+(\tan\theta)^{2021}}$, then the value of $\sum_{\theta=1^\circ}^{89^\circ} f(\theta)$ is equal to

A. 45

B. 44

C. $\dfrac{89}{2}$

D. $\dfrac{91}{2}$

Answer: C

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5. If the circle $x^2+y^2=4x+8y+5$ intersects the line $3x-4y=m$ at two distinct points, then the number of possible integral values of m is equal to

A. 51

B. 50

C. 49

D. 48

Answer: C

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6. Let 2 planes are being contained by the vectors $\alpha\hat{i} + 3\hat{j} - \hat{k}, \hat{i} + (\alpha - 1)\hat{j} + 2\hat{k}$ and $3\hat{i} + 5\hat{j} + 2\hat{k}$. If the angle between these 2 planes is θ, then the value of $\cos^2\theta$ is equal to

A. $\frac{15}{17}$

B. $\frac{289}{717}$

C. $\frac{289}{2151}$

D. $\frac{17}{2151}$

Answer: C

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7. If $(1, 2, p), (2, 8, -6)$ and $\left(\alpha^2 - 2\alpha, p, 1\right)$ are ordered triplet pair of the form (x, y, z) which satisfy all the equations $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1, \frac{x}{b} + \frac{y}{c} + \frac{z}{a} = 1$ and $\frac{x}{c} + \frac{y}{a} + \frac{z}{b} = 1,$ then the sum of all the values of α is equal to (where, $ab + bc + ca \neq 0$)

A. 3

B. 2

C. 0

D. -2

Answer: B

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8. If α, β and γ are the roots of the equation $x^3 - px^2 + qx - r = 0$, then the value of $\frac{\alpha\beta}{\gamma} + \frac{\beta\gamma}{\alpha} + \frac{\gamma\alpha}{\beta}$ is equal to

A. $pq + 3r$

B. $pq + r$

C. $pq - 3r$

D. $\frac{q^2 - 2pr}{r}$

Answer: D

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9. Let p, q and r be three statements. Consider two compound statements

$S_1 : (p \Rightarrow q) \Rightarrow r \equiv p \Rightarrow (p \Rightarrow r)$

$S_2 : (p \Leftrightarrow q) \Leftrightarrow r \equiv p \Leftrightarrow (q \Leftrightarrow r)$

State in order, whether S_1, S_2 are true of false.

(where, T represents true F represents false)

A. TT

B. TF

C. FT

D. FF

Answer: A

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10. Two poles standing on a horizontal ground are of height x meters and 40 meters respectively. The line joining their tops makes an angle of 30° with the ground and the distance between the foot of the poles is $30\sqrt{3}$ meters, then the value of x can be

A. 20

B. 30

C. 10

D. 50

Answer: C

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11. If the function $f: R \to A$ defined as $f(x) = \sin^{-1}\left(\frac{x}{1+x^2}\right)$ is a surjective function, then the set A is

A. $\left[-\frac{\pi}{6}, \frac{\pi}{6}\right]$

B. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

C. $\left[-\frac{\pi}{3}, \frac{\pi}{6}\right]$

D. $\left[0, \frac{\pi}{3}\right]$

Answer: A

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12. If function $f(x) = \begin{cases} a\sqrt{x+7} & 0 \leq x < 2 \\ bx+1 & x \geq 2 \end{cases}$ is differentiable $a \geq 0$, then the $2a + 4b$ is equal to

A. 1

B. 5

C. 4

D. 9

Answer: A

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13. The integral $I = \int \frac{2\sin x}{(3+\sin 2x)} dx$ simplifies to (where, C is the constant of integration)

A. $\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right| - \tan^{-1}(\sin x+\cos x)+C$

B. $\ln(\sin x)+\sin 2x+C$

C. $\sin(2x)-\ln(\cos x)+C$

D.

$$\frac{1}{4}\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right|-\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)+C$$

Answer: D

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14. The least positive term of an arithmetic progression whose first two term are $\frac{5}{2}$ and $\frac{23}{12}$ is

A. 6

B. 5

C. $\frac{1}{6}$

D. $\frac{37}{7}$

Answer: C

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15. Let $f(x) = \min\left(x+1, \sqrt{1-x}\right) \forall x \leq 1$. Then, the area (in sq. units(bounded by $y = f(x), y = 0$ and $x = 0$ from $y = 0$ to $x = 1$ is equal to

A. $\frac{1}{3}$

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

C. $\frac{4}{9}$

D. 1

Answer: B

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16. The solution of the differential equation $ydx - xdy + \ln x dx = 0$ is (where, C is an arbitrary constant)

A. $y = (\ln x)^2 + C$

B. $y = (\ln x + 1) + C$

C. $y = -(\ln x + 1) + C$

D. $y = (\ln x)(x + C)$

Answer: D

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17. The perpendicular bisector of the line segment joining A(1, 4) and B(t, 3) has y - intercept equal to -4. Then, the product of all possible values of t is equal to

A. 1

B. 2

C. -16

D. -4

Answer: C

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18. Dice A has 4 red and 2 white faces whereas dice B has 3 red and 3 white faces. A coin is tossed once, if it falls head then the game continues by throwing the dice A and if it falls tail then the dice B is to be used. If red turns up at first 3 throws, then the probability that dice A is being used is

A. $\frac{7}{37}$

B. $\frac{64}{91}$

C. $\frac{9}{41}$

D. $\frac{27}{35}$

Answer: B

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19. If the normals at two points (x_1, y_1) and (x_2, y_2) of the parabola $y^2 = 4x$ meets again on the parabola, where $x_1 + x_2 = 8$ then $|y_1 - y_2|$ is equal to

A. $\sqrt{2}$

B. 3

C. 4

D. 2

Answer: C

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20. If the locus of the complex number z given by $arg(z+i) - arg(z-i) = \frac{2\pi}{3}$ is an arc of a circle, then the length of the arc is

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

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

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

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

Answer: B

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21. The coefficient of the $(2m+1)^{\text{th}}$ and $(4m+5)^{\text{th}}$ terms in the expansion of $(1+x)^{100}$ are equal, then the value of $\frac{m}{2}$ is equal to

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22. If the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-4}{4}$ intersect the xy and yz plane at points A and B respectively. If the volume of the tetrahedron OABC is V cubic units (where, O is the origin) and point C is (1, 0, 4), then the value of 102V is equal to

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23. The value of $\lim_{x \to 0} \frac{\sin^2 3x}{\sqrt{3 + \sec x} - 2}$ is equal to

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24. If the acute formed between y - axis and the tangent drawn to the curve $y = x^2 + 4x - 17$ at the point $P\left(\frac{5}{2}, -\frac{3}{4}\right)$ is θ, the value of $\cot \theta$ is equal to

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25. Let C_1 be the graph of $xy = 1$ and the reflection of C_1 in the line $y = 2x$ is C_2. If the equation of C_2 is expressed as $12x^2 + bxy + cy^2 + d = 0$, then the value of $(b + c + d)$ is equal to

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