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MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 71

Mathematics

1. The number of real solutions the equation $\sqrt{x+14-8\sqrt{x-2}}+\sqrt{x+23-10\sqrt{x-2}}=3$ are

A. 2

B. 4

C. 8

D. infinite

Answer: A

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2. If the numbers $3^{2a-1}, 14, 3^{4-2a}(0 < a < 1)$ are the first three terms of an arithmetic progression, then its fifth term is equal to

A. 33

B. 43

C. 53

D. 63

Answer: C

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3. If $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, then $\frac{dy}{dx}$ is equal to

A. $\frac{-2}{1+x^2}$ for all x

B. $\frac{2}{1+x^2}$ for all $|x| < 1$

C. $\frac{2}{1+x^2}$ for all $|x| > 1$

D. None of these

Answer: B

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4. The domain of the function $f(x) = \log_3\left[1 - \log_6\left(x^2 - 7x + 16\right)\right]$ is

A. (2, 5)

B. $(\infty, 5)$

C. $[2, \infty)$

D. $[2, 5]$

Answer: A

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5. The value of $\lim_{x \to -\infty} \frac{x^2 \tan\left(\frac{2}{x}\right)}{\sqrt{16x^2 - x + 1}}$ is equal to

A. 1

B. $\frac{1}{2}$

C. -1

D. $-\frac{1}{2}$

Answer: D

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6. The compound statement $(p \to \sim q) \vee (p \wedge q)$ is logically equivalent to

A. $p \Leftrightarrow q$

B. $p \wedge q$

C. Tautology

D. Contradication

Answer: C

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7. The angular elevation of tower CD at a point A due south of it is 60° and at a point B due west of A, the elevation is 30°. If AB = 5 km, then the height of the tower is (where, C, B and A are on the same ground level)

A. $2\sqrt{3}km$

B. $2\sqrt{6}km$

C. $\frac{5\sqrt{3}}{2}km$

D. $\frac{5\sqrt{3}}{2\sqrt{2}}km$

Answer: D

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8. If $x = \sin\left(2\tan^{-1}2\sqrt{3}\right)$ and $y = \sin\left(\frac{1}{2}\tan^{-1}.\frac{12}{5}\right)$, then

A. $x = 1 - y$

B. $x^2 = 1 - 2y$

C. $x^2 = 1 + y$

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

Answer: D

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9. The points on the curve $f(x) = \dfrac{x}{1-x^2}$, where the tangent to it has slope equal to unity, are $(x_1, y_1), (x_2, y_2)$ and (x_3, y_3). Then, $x_1 + x_2 + x_3$ is equal to

A. 0

B. $\dfrac{\sqrt{3}}{2}$

C. $\dfrac{\sqrt{3}}{4}$

D. $\sqrt{3}$

Answer: A

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10. Which of the following statements is correct?

A. If $f(x)$ is an odd function, then $g(x) = \displaystyle\int_a^x f(t)dt$ is an even function.

B. If $f(x)$ is an odd function, then $g(x) = \int_a^x f(t)dt$ is also odd.

C. If $f(x)$ is a periodic function, then $g(x) = \int_a^x f(t)dt$ is also periodic.

D. If $f(x)$ is periodic, then $g(x) = \int_a^x f(t)dt$ is always non - periodic.

Answer: A

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11. The area (in sq. units) bounded between the curves $y = e^x \cos x$ and $y = e^x \sin x$ from $x = \frac{\pi}{4}$ to $x = \frac{\pi}{2}$ is

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

B. $\frac{e^{\frac{\pi}{4}}}{\sqrt{2}}$

C. $\frac{e^{\lambda}}{\sqrt{2}}$

D. $\frac{e^{\lambda}}{2}$

Answer: B

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12. The curve passing through $P\left(2, \frac{7}{2}\right)$ and having place $1 - \frac{1}{x^2}$ at P (x,y) also passes through

A. $\left(-2, \frac{2}{3}\right)$

B. $\left(-2, -\frac{3}{2}\right)$

C. $(-2, 1)$

D. $(-2, 6)$

Answer: B

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13. A bag contains 2 red, 3 white and 5 black balls, a ball is drawn its colour is noted and replaced. If the probability of getting a red ball for the first time at the n^{th} trial is atleast $\frac{2}{25}$, then the greatest value of n is equal to

A. 4

B. 5

C. 6

D. 7

Answer: B

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14. If a, b, c are non - zero real numbers, the system of equations $y + z = a + 2x, x + z = b + 2y, x + y = c + 2z$ is consistent and

$b = 4a + \frac{c}{4}$, then the sum of the roots of the equation $at^2 + bt + c = 0$ is

A. 3

B. 2

C. -2

D. -3

Answer: D

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15. Let A be a matrix of order 3 such that $A^2 = 3A - 2I$ where, I is an identify matrix of order 3. If $A^5 = \alpha a + \beta I$, then $\alpha\beta$ is equal to

A. 2025

B. -2025

C. -930

D. -640

Answer: C

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16. A line L lies in the plane $2x - y - z = 4$ such that it is perpendicular to the line $\frac{x-2}{2} = \frac{y-3}{1} = \frac{z-4}{5}$. The line L passes through the point of intersection of the given line and given plane. Which of the following points does not satisfy line L?

A. $\left(-5, -\frac{1}{2}, -\frac{27}{2}\right)$

B. $(3, 1, 6)$

C. $\left(0, \frac{29}{2}, \frac{-37}{2}\right)$

D. $\left(-4, \frac{5}{2}, \frac{-29}{2}\right)$

Answer: B

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17. A line $4x + y = 1$ passes through the point A(2,-7) and meets line BC at B whose equation is $3x - 4y + 1 = 0$, the equation of line AC such that $AB = AC$ is (a) 52x +89y +519=0(b) 52x +89y-519=0 c) 82x +52y+519=0 (d) 89x +52y -519=0

A. $-\frac{519}{52}$

B. $\frac{519}{52}$

C. $-\frac{519}{89}$

D. $\frac{519}{89}$

Answer: A

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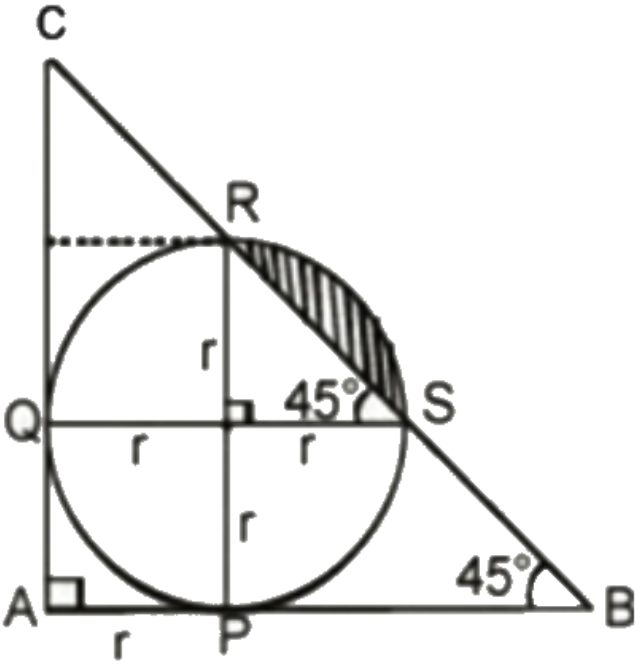
18. ABC is a right triangle, right - angled at the vertex A. A circle is drawn to touch the sides AB and AC at points P and Q respectively

such that the other end points of the diameters passing through P and Q lie on the side BC. IF AB = 6 units, then the area (in sq. units) of the circular sector which lies inside the triangle is



A. $3\pi + 2$

B. $\pi + 3$

C. $\pi - 2$

D. $\pi + 2$

Answer: A

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19. If e_1 and e_2 are the eccentricities of the ellipse $\frac{x^2}{18} + \frac{y^2}{4} = 1$ and the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ respectively and (e_1, e_2) is a point on the ellipse $15x^2 + 3y^2 = k$, then the value of k is equal to

A. 16

B. 17

C. 15

D. 14

Answer: A

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20. Two points P and Q in the argand plane represent the complex numbers z and $3z + 2 + u$. If $|z| = 2$, then Q moves on the circle, whose centre and radius are (here, $i^2 = -1$)

A. $-2 + i, 6$

B. $2 - i, 3$

C. $2 + i, 6$

D. $2 + i, 2$

Answer: C

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21. Let AB is the focal chord of a parabola and D and C be the foot of the perpendiculars from A and B on its directrix respectively. If CD = 6 units and area of trapezium ABCD is 36 square units, then the length (in units) of the chord AB is

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22. A total of 6 Boys and 6 girls are to sit in a row alternatively and in a circle. Let m be the number of arrangements in the row and n be the number of arrangements in the circle. If $k = \frac{m}{10_n}$, then the value of k is

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23. Let $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{i}$, $\vec{b} = \hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = (x-2)\hat{i} - (x-3)\hat{j} - \hat{k}$. If $\vec{c}$ lies in the plane of $\vec{a}$ and $\vec{b}$, then $\frac{1}{x}$ is equal to

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24. If $I = \int \frac{dx}{x^2\sqrt{1+x^2}} = \frac{f(x)}{x} + C, (\forall x > 0)$ (where, C is the constant of integration) and $f(1) = -\sqrt{2}$, then the value of $\left|f\left(\sqrt{3}\right)\right|$

is

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25. Number of integral terms in the expansion of $\left(\sqrt{5}+\sqrt[8]{7}\right)^{1024}$ is

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