MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 90

Mathematics

1. Consider three statements

p : Aman will come today

q : Aditi will be at her home

r : They will go to party.

Then, the statement $(q \wedge \sim r) \Rightarrow p$ is logically equivalent to

A. If Aman will not come today then they will go to party.

B. If Aman will not come today then they will not go to party.

C. Aman will come today or Aditi will not be at her home or they will go to party.

D. Aman will come today or Aditi will go to party.

Answer: C

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2. Let $f(x) = \begin{cases} \frac{1+\cos x}{(\pi - x)^2} \cdot \frac{\sin^2 x}{\ln(1+\pi^2-2\pi x+x^2)} & x \neq \pi \\ \lambda & x = \pi \end{cases}$

A. 1

B. -1

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

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

Answer: C

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3. The set $(A \cup B \cup C) \cap (A \cap B' \cap B')' \cap C$ is equal to

A. $A \cap B$

B. A

C. $B \cap C'$

D. C

Answer: D

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4. Consider the following two statements P and Q.

$$P : \cos^{-1}\left(\cos.\ \frac{4\pi}{3}\right) = \frac{4\pi}{3}$$

$$Q : \sec^2\left(\cot^{-1}.\ \frac{1}{2}\right) + \operatorname{cosec}^2\left(\tan^{-1}.\ \frac{1}{3}\right) = 15$$

Then, which of the following true?

A. Both P and Q are true

B. P is true, but Q is false

C. P is false, but Q is true

D. Both P and Q are false

Answer: C

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5. Let $\vec{a}$ and $\vec{b}$ be two orthogonal unit vectors and $\vec{c}$ is a vector such that $\vec{c} \times \vec{b} = \vec{a} - \vec{c}$, then $\left|\vec{c}\right|$ is equal to

A. 1

B. $\sqrt{2}$

C. $\frac{1}{\sqrt{2}}$

D. 2

Answer: C

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6. The angle between the tangents drawn from the point $(4, 1)$ to the parabola $x^2 = 4y$ is

A. $\frac{\pi}{6}$

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

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

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

Answer: C

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7. Let A and B be two symmetric matrices. prove that AB=BA if and only if AB is a symmetric matrix.

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8. A biased coin is tossed repeatedly until a tail appears for the first time. The head is 3 times likely to appear as the tail. The probability that the number of tosses

required will be more than 4, given that in first two toss no tail has occur, is

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

B. $\frac{7}{8}$

C. $\frac{9}{16}$

D. $\frac{11}{32}$

Answer: C

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9. The remainder obtained when 51^{25} is divided by 13 is

A. 3

B. 7

C. 12

D. 11

Answer: C

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10. $\frac{5}{1^2 \cdot 4^2} + \frac{11}{4^2 \cdot 7^2} + \frac{17}{7^2 \cdot 10^2} +$

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

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

C. 2

D. 3

Answer: B

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11. If the area bounded by the curves $\{(x, y) \mid x^2 - y + 1 \geq 0\}$ and $\{(x, y) \mid x + y - 3 \geq 0\}$ is k square units, then the value of 3k is equal to

A. 27

B. 9

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

D. $\frac{27}{2}$

Answer: D

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12. Find the number of ordered pairs of (x, y) satisfying the equation $y = |\sin x|$ and $y = \cos^{-1}(\cos x)$, where $x \in [-\pi, \pi]$

A. 1

B. 2

C. 3

D. 4

Answer: C

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13. Let $P \equiv (a, 0), Q \equiv (-1, 0)$ and $R \equiv (2, 0)$ are three given points. If the locus of the point S satisfying the reaction $SQ^2 + SR^2 = 2SP^2$ is $2x + 3 = 0$. Then the sum of all possible values of a is

A. 1

B. -4

C. 3

D. -3

Answer: D

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14. The equation of the plane which passes through the point of intersection of $\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-3}{2}$ and $\frac{x-3}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ and perpendicular to $4\hat{i}+3\hat{j}+5\hat{k}$, is

A. $4x+3y+5z=50$

B. $4x+3y+5x=25$

C. $4x+3y+5z=10$

D. $4x-3y+5z=50$

Answer: A

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15. If the common tangets of $x^2 + y^2 = r^2$ and $\frac{x^2}{16} + \frac{y^2}{9} = 1$ form a square, then the area (in sq. units) of the square is

A. 50

B. 100

C. 25

D. 40

Answer: A

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16. If z_i (where $i = 1, 2, \ldots\ldots\ldots\ldots\ldots\ldots .6$) be the roots of the equation $z^6 + z^4 - 2 = 0$, then $\Sigma_{i=1}^{6} |z_i|^4$ is equal to

A. 4

B. 6

C. 8

D. 10

Answer: D

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17. The cosine of the acute angle between the curves $y = |x^2 - 1|$ and $y = |x^2 - 3|$ at their points of intersection is

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

B. $\frac{7}{9}$

C. $\frac{11}{9\sqrt{2}}$

D. $\frac{2}{7}$

Answer: B

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18. The integral $I = \int \left(\frac{1}{x.\sec x} - \ln\left(x^{\sin x}\right) \right) dx$ simplifies to (where, c is the constant of integration)

A. $(\ln x)(\sin x) + c$

B. $(\ln x)(\cos x) + c$

C. $x \ln(\sin x) + c$

D. $x \ln(\cos x) + c$

Answer: B

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19. If $0 < \alpha < \frac{\pi}{3}$, then $\alpha(\sec \alpha)$ is

A. less than $\frac{\pi}{3}$

B. greater than $\frac{\pi}{3}$

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

D. greater than $\frac{2\pi}{3}$

Answer: C

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20. If the curve satisfies the differential equation $x.\frac{dy}{dx} = x^2 + y - 2$ and passes through (1, 1), then is also passes through the point

A. (4, 4)

B. (3, 3)

C. (2, 2)

D. (0, 0)

Answer: C

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21. If $\lim_{x \to 0} \frac{\sin 2x - a \sin x}{\left(\frac{x}{3}\right)^3} = L$ exists finitely, then the absolute value of L is equal to

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22. Let $A = \left[a_{ij}\right]_{5\times 5}$ is a matrix such that $a_{ij} = \begin{cases} 3 & \forall i = j \\ 0 & Aai \neq j \end{cases}$. If $\left|\frac{adj(adjA)}{3}\right| = \left(\sqrt{3}\right)^{\lambda}$, then λ is equal to (where, $adj(M)$ represents the adjoint matrix of matrix M)

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23. If the number of solutions of the equation $x + y + z = 20$, where $1 \leq x < y < z$ and $x, y, z \in I$ is k, then $\frac{k}{10}$ is equal to

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24. From the point A(0, 3) on the circle $x^2 + 4x + (y-3)^2 = 0$, a chord AB is drawn and extended from point B to a point M such that AM = 2AB. The perimeter of the locus of M is $p\pi$ units. Then, the value of p is

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25. $I = \int_0^2 \frac{e^{f(x)}}{e^{f(x)} + e^{f(2-x)}} dx$ is equal to

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