MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 104

Mathematics

1. If $4x - ay + 3z = 0, x + 2y + ax = 0$

and $ax + 2z = 0$ have a non - trivial solution, then the number of real value(s) of a is

A. 0

B. 1

C. 2

D. 3

Answer: B

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2. Triangle ABC is right angled at A. The circle with centre A and radius AB cuts BC and AC internally at D and E respectively. If BD=20 and DC=16 then the length AC equals

A. $6\sqrt{21}$ units

B. $6\sqrt{26}$ units

C. 30 units

D. 32 units

Answer: B

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3. Consider the quadratic polynomial $f(x) = \frac{x^2}{4} - ax + a^2 + a - 2$ then (i) If the origin lies between zero's of polynomial, then number of integral value(s) of 'a' is (ii) if a varies , then locus of the vertex is :

A. 1

B. 2

C. 3

D. more than 3

Answer: B

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4. Sum of an infinite G.P. is $\frac{5}{4}$ times the sum of all the odd terms. The common ratio of the G.P. is

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

B. 4

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

D. 6

Answer: A

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5. The value of x satisfying the equation $|\sin x \cos x| + \sqrt{2 + \tan^2 x + \cot^2 x} = \sqrt{3}$

A. belongs to $\left[0, \frac{\pi}{3}\right]$

B. belongs to $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$

C. belongs to $\left[\frac{3\pi}{4}, \pi\right)$

D. does not exist

Answer: D

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6. if $f(x) = e^{-\frac{1}{x^2}}, x \neq 0$ and $f(0) = 0$ then $f'(0)$ is

A. not defined

B. 1

C. 0

D. 2

Answer: C

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7. The value of $\lim_{x \to 0^+} ((x \cot x) + (x \ln x))$ is equal to

A. 1

B. 2

C. 3

D. 0

Answer: A

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8. Which of the following is true?

(i) If p is a statement then $\sim p$ is not a statement

(ii) If p is a statement then $\sim p$ is also a statement

(iii) Negation of $''p: x$ is a positive real number" is , "x is a negative real number"

A. Only (ii)

B. Only (i)

C. (i) and (iii)

D. None of these

Answer: A

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9. Two poles of height a and b stand at the centers of two circular plots which touch each other externally at a point and the two poles subtend angles of 30° and 60° respectively at this point, then distance between the centers of these plots is

A. $a + b$

B. $\frac{(3a + b)}{\sqrt{3}}$

C. $\frac{(a + 3b)}{\sqrt{3}}$

D. $a\sqrt{3} + b$

Answer: B

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10. Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 4\hat{j} - \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} + 2\hat{k}$. If $\vec{S}$ be a unit vector, then the magnitude of the vector $\left(\vec{a} . \vec{S}\right)\left(\vec{b} \times \vec{c}\right) + \left(\vec{b} . \vec{S}\right)\left(\vec{c} \times \vec{a}\right) + \left(\vec{c} . \vec{S}\right)\left(\vec{a} \times \vec{b}\right)$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

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11. Two numbers a and b are chosen simultaneously from the set of integers 1, 2, 3, ..., 39, then the probability that the equation $7a - 9b = 0$ is satisfied is

A. $\frac{1}{247}$

B. $\frac{2}{247}$

C. $\frac{4}{741}$

D. $\frac{5}{741}$

Answer: C

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12. Let the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$ and $BA = A$ where B represent 3×3 order matrix. If the total number of 1 in matrix A^{-1} and matrix B are p and q respectively. Then the value of $p + q$ is equal to

A. 3

B. 4

C. 5

D. 7

Answer: D

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13. Find the term independent of x in the expansion of $\left(1+x+2x^3\right)\left[\left(3x^2/2\right)-(1/3)\right]^9$

A. $\frac{13}{63}$

B. $\frac{19}{45}$

C. $\frac{17}{54}$

D. $\frac{23}{36}$

Answer: C

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14. The maximum negative integral value of b for which the point $\left(2b+3, b^2\right)$ lies above the line

$3x-4y-a(a-2)=0, \forall a \in R$ is

A. -1

B. -3

C. -2

D. -4

Answer: C

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15. The numberof ways in which 2n distinct letters (addressed) can be distributed in N distinct mail boxes such that there are exactly K letters $(n < K \leq 2n)$ in one of the mail boxes is

A. ${}^{2n}C_K$

B. ${}^{2n}C_K . N(N-1)^{2n-K}$

C. ${}^{2n}C_K . (N-1)^{2n-K}$

D. ${}^{2n}C_K (2n-K)^{N-1 . N}$

Answer: B

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16. From a variable point P on the tagent at the vertex of the parabola $y^2 = 2x$, a line is drawn perpendicular to the chord of contact. These variable lines always pass through a fixed point, whose x - coordinate is

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

B. 1

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

D. 2

Answer: B

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17. If the complex number $\omega = x + iy\left(\forall x, y \in R \text{ and } i^2 = -1\right)$ satisfy the equation $\omega^3 = 8i$, then the maximum vlaue of y is

A. 1

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

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

D. 2

Answer: A

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18. If $f(x)$ is a twice differentiable function such that $f(0) = f(1) = f(2) = 0$. Then

A. $F(x) = 0$ has exactly 3 roots

B. $f'(x) =$ for atleast 3 real values of x

C. $f''(x) = 0$ for atleast 2 real value of x

D. $f''(x) = 0$ for atleast 1 real value of x

Answer: D

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19. Let $y = f(x)$ be a solution of the differential equation $\frac{dy}{dx} = \frac{y^2 - x^2}{2xy} (\forall x, y > 0)$. If $f(1) = 2$, then $f'(1)$ is equal to

A. 2

B. $\frac{5}{2}$

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

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

Answer: D

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20. The value of the integral $\int_{-1}^{1} \frac{dx}{(1+x^2)(1+e^x)}$ is equal to

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

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

C. π

D. 0

Answer: A

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21. If the variance of the data $12, 14, 18, 19, 21, 36$ is λ, then the value of 3λ is equal to

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22. If the plane $ax - by + cz = d$ contains the line $\frac{x-a}{a} = \frac{y-2d}{b} = \frac{z-c}{c}$, then the value of $\frac{b}{4d}$ is equal to $(b, d \neq 0)$

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23. The vertices of the triangle ABC are $A(0, 0), B(3, 0)$ and $C(3, 4)$, where A and C are foci of an ellipse and B lies on the ellipse. If the length of the latus rectum of the ellipse is $\frac{12}{p}$ units, then the vlaue of p is

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24. If $\cos 2x + 2\cos x = 1$, then $\left(\sin^2 x\right)\left(2 - \cos^2 x\right)$ is equal to

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25. Consider $\int \frac{3x^4 + 2x^2 + 1}{\sqrt{x^4 + x^2 + 1}} dx = f(x)$. If $f(1) = \sqrt{3}$, then $(f(2))^2$ is equal to

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