MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 96

Mathematics

1. The sum of the series

$$.^{20}C_0 - .^{20}C_1 + .^{20}C_2 - .^{20}C_3 + ... - . + .^{20}C_{10}$$

is -

A. $-.^{20}C_{10}$

B. $\frac{1}{2}.^{20}C_{10}$

C. 0

D. $.^{20}C_{10}$

Answer: B

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2. Let A be a non - singular symmetric matrix of order 3. If $A^T = A^2 - I$, then $(A - I)^{-1}$ is equal to

A. A

B. 2A

C. $A - I$

D. $2A - I$

Answer: A

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3. The value of $\lim_{x \to 2\pi} \frac{1 - (\sec x)^{\sec x}}{\ln(\sec x)}$ is equal to

A. 0

B. 1

C. 2

D. -1

Answer: D

4. Let the point at which the circle passing through (0, 0) and (1, 0) touches the circle $x^2 + y^2 = 9$ is P(h, k), then $|k|$ is equal to

A. $\sqrt{5}$

B. $2\sqrt{2}$

C. $\sqrt{6}$

D. $\sqrt{7}$

Answer: B

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5. If the vectors

$(x^2-1)\hat{i}+2(x^2-1)\hat{j}-3(x^2-1)\hat{k}$,

$(2x^2-1)\hat{i}+(2x^2+1)\hat{j}+x^2\hat{k}$ and

$(3x^2+2)\hat{i}+(x^2+4)\hat{j}+(x^2+1)\hat{k}$ are non -

coplanar, then the number of real value x cannot take is

A. 1

B. 2

C. 4

D. 6

Answer: B

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6. Let the equation of a line through $(3, 6, -2)$ and parallel to the planes $x - y + 2z = 5$ and $3x + y + 2z = 6$ is $L = 0$. If point $(\alpha, \beta, 2)$ satisfy $L = 0$, then $\alpha + 2\beta$ is equal to

A. 10

B. 13

C. 15

D. 19

Answer: D

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7. If one of the roots of the equation $\begin{vmatrix} 7 & 6 & x^2-25 \\ 2 & x^2-25 & 2 \\ x^2-25 & 3 & 7 \end{vmatrix} = 0$ is $x = 3$, then the sum of all other five roots is

A. 0

B. -3

C. -6

D. -8

Answer: B

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8. If there are nine straight lines of which five are concurrent at a point and the other four are concurrent at another point and no two of these nine lines are parallel, then the number of points of intersection is equal to

A. 20

B. 22

C. 36

D. 38

Answer: B

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

A. $pq + 3r$

B. $pq + r$

C. $pq - 3r$

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

Answer: C

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10. If $f(x) = \begin{cases} a + \tan^{-1}(x - b) & x \geq 1 \\ \frac{x}{2} & x < 1 \end{cases}$

is differentiable at x = 1, then $4a - b$ can be

A. 0

B. 1

C. -1

D. π

Answer: D

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11. If the function $f: R \to A$ defined as $f(x) = \tan^{-1}\left(\frac{2x^3}{1+x^6}\right)$ is a surjective function, then the set A is equal to

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

B. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

C. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

D. $\left[0, \frac{\pi}{4}\right]$

Answer: B

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12. A vertical tower subtends an angle of 60° at a point on the same level as the foot of the tower. On moving 100 m further in line with the tower, it subtends an angle of 30° at the point. Then, the height of the tower, it subtends an angle of 30° at the point. Then, the height of the tower is

A. $20\sqrt{3}m$

B. $30\sqrt{3}m$

C. $50\sqrt{3}$

D. $10\sqrt{3}m$

Answer: C

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13. The area bounded by the parabola $y = x^2 + x + 1$, its tangent at P(1, 3), line

$x = -1$ and the x - axis is A sq units. Then, the value of 6A is equal to

A. a prime number

B. a composite number

C. an irrational number

D. a non - integer

Answer: A

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14. The solution of the differential equation $xdx + ydy = \frac{xdy - ydx}{x^2 + y^2}$ is $\tan(f(x, y) - C) = \frac{y}{x}$ (where, C is an arbitrary constant). If $f(1, 1) = 1$, then $f(\pi, \pi)$ is equal to

A. 2

B. π^2

C. -1

D. π

Answer: B

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15. The function $f(x) = x^3 - 6x^2 + ax + b$ satisfy the conditions of Rolle's theorem on [1,3] which of these are correct ?

A. 1

B. 11

C. 22

D. 2

Answer: B

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16. If the image of the point $M(\lambda, \lambda^2)$ on the line $x + y = \lambda^2$ is N(0, 2), then the sum of the square of all the possible values of λ is equal to

A. 5

B. 2

C. 1

D. 4

Answer: A

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17. The first, second and seventh terms of an arithmetic progression (all the terms are distinct) are in geometric progression and the sum of these three terms is 93. Then, the fourth term of this geometric progression is

A. 21

B. 31

C. 75

D. 375

Answer: D

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18. The points A(3, 6) and B lie on the parabola $y^2 = 4ax$, such that the chord AB subtends 90° at the origin, then the length of the chord AB is equal to

A. $15\sqrt{13}$ units

B. $12\sqrt{17}$ units

C. $9\sqrt{17}$ units

D. $9\sqrt{10}$ units

Answer: A

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19. Let P(h, k) be a point on an argand plane equidistant from the roots of the equation $(z+1)^4 = 16z^4$, then the value of h is equal to

A. 0

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

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

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

Answer: C

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20. If $x + y = 3 - \cos 4\theta$ and $x - y = 4 \sin 2\theta$,the value of $\sqrt{x} + \sqrt{y}$ is equal to

A. 2

B. 4

C. 6

D. 8

Answer: A

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21. 2 Players A, B tosses a fair coin in cyclic order A, A, B, A, A, B.... Till a head appears. If the probability that A gets head first is p, then $\frac{24}{p}$ is equal to

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22. A number equal to 4 times of the mean and a frequency equal to k is inserted in the data of n observations. If the new mean is $\frac{7}{5}$ times the old mean, then $\frac{n}{k}$ is equal to

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23. If the integral $I = \int \frac{\tan x}{5 + 7\tan^2 x} dx = k \ln|f(x)| + C$ (where C is the integration constant) and $f(0) = \frac{5}{7}$, then the value of $f\left(\frac{\pi}{4}\right)$ is equal to

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24. If the value of definite integral $A = \int_0^{10\pi} [\sin x] dx$ is equal to $k\pi$, then the absolute value of k is equal to (where, $[.]$ is the greatest integer function)

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25. The area (in sq. units) of the triangle formed by the latus rectum and the tangents at the end points of the latus rectum of $\frac{x^2}{16} - \frac{y^2}{9} = 1$ is equal to

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