MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 92

Mathematics

1. The value of a, such that the volume of the parallelopiped formed by the vectors $\hat{i}+\hat{j}+\hat{k}, \hat{j}+a\hat{k}$ and $a\hat{i}+\hat{k}$ becomes minimum, is

A. 3

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

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

D. -2

Answer: C

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2. $AandB$ toss a fair coin each simultaneously 50 times. The probability that both of them will not get tail at the same toss is $(3/4)^{50}$ b. $(2/7)^{50}$ c. $(1/8)^{50}$ d. $(7/8)^{50}$

A. $\left(\frac{3}{4}\right)^{10}$

B. $\left(\frac{2}{7}\right)^{10}$

C. $\left(\frac{1}{4}\right)^{10}$

D. $\left(\frac{1}{2}\right)^{10}$

Answer: A

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3. A plane P = 0 passes through the line of intersection of the planes $x + y + z + 3 = 0$ and $x - y + z - 2 = 0$. If the plane P divides the ratio $2:1$ internally and the equation of the plane is $ax - 2y + bz = c$ where $a, b, c \in N$, then the value of $3a + 4b - 5c$ is equal to

A. 22

B. 32

C. 42

D. 10

Answer: B

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4. Let A and B are two non - singular matrices of order 3 such that $A + B = 2I$ and $A^{-1} + B^{-1} = 3I$, then AB is equal to (where, I is the identity matrix of order 3)

A. A

B. B

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

D. 21

Answer: C

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5. Let f(b) be the minimum value of the expression $y = x^2 - 2x + \left(b^3 - 3b^2 + 4\right) \forall x \in R.$ Then, the maximum value of f(b) as b varies from 0 to 4 is

A. 20

B. 19

C. 63

D. 64

Answer: B

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6. Consider the intergral $A = \int_0^1 \frac{e^x - 1}{x} dx$ and $B = \int_0^1 \frac{x}{e^2 - 1} dx$. Then, which of the following is incorrect?

A. $B < 1$

B. $A > 1$

C. $B > A$

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

Answer: C

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7. If $a, b \in R$ satisfy the equation $a^2 + 4b^2 - 4 = 0$, then the minimum value of $(2a + 3b)$ will be

A. -4

B. -5

C. -6

D. -10

Answer: B

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8. The equation of the curve satisfying the differential equation $x^2dy = (2-y)dx$ and passing through $P(1,4)$ is

A. $y = x^2 + 3$

B. $y = 2 + 2e^{\frac{1}{x}-1}$

C. $y = \sin(x-1) + 4$

D. $y = 2e^{x-1} + 2$

Answer: B

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9. The domain of $f(x) = \dfrac{x}{16-x^2} + \log_2\left(x^3 - 2x\right)$ is

A. $\left(-\sqrt{2}, 0 \right) \cup \left(\sqrt{2}, \infty \right)$

B. $\left(-\sqrt{2}, 0 \right) \cup \left(\sqrt{2}, 4 \right)$

C. $\left(-\sqrt{2}, 0 \right) \cup (4, 00)$

D. $\left(-\sqrt{2}, 0 \right) \cup \left(\sqrt{2}, 4 \right) \cup (4, \infty)$

Answer: D

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10. Let p.q and r be three statements, then $(\sim p \to q) \to r$ is equivalent to

A. $(\sim p \vee r) \wedge (q \vee r)$

B. $(p \to r) \wedge (q \to r)$

C. $(\sim p \wedge r) \vee (q \vee r)$

D. $(p \to q) \to r$

Answer: B

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11. The value of $\lim_{x \to \frac{\pi}{2}} \frac{\left[\frac{x}{3}\right]}{\ln(1 + \cot x)}$ is equal to (where, $[.]$ denotes the greatest integer function)

A. does not exist

B. is equal to 1

C. is equal to 0

D. is equal to -1

Answer: C

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12. A data consists of n observations : $x_1, x_2, \ldots\ldots, x_n$. If $\Sigma_{i=1}^{n}(x_i+1)^2 = 11n$ and $\Sigma_{i=1}^{n}(x_i-1)^2 = 7n$, then the variance of this data is

A. 5

B. 8

C. 6

D. 7

Answer: D

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13. Which of the following is a correct statement ?

A. Continuity at $x = a$ is sufficient for differentiability at $x = a$

B. Differentiability at $x = a$ is sufficient for continuity at $x = a$

C. Existence of limit at $x = a$ is sufficient for continuity at $x = a$

D. Differentiability at $x = a$ is necessary for existence of tangent at $x = a$

Answer: B

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14. The term independent of x in the expansion of $\left(x-\frac{1}{x}\right)^4\left(x+\frac{1}{x}\right)^3$ is:

A. -3

B. 0

C. 1

D. 3

Answer: B

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15. The number of ways in which four different toys and five indistinguishable marbles can be distributed between 3 boys, if each boy receives at least one toy and at least one marble, is

A. 42

B. 100

C. 150

D. 216

Answer: D

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16. If $p^{\text{th}}, 2p^{\text{th}}$ and $4p^{\text{th}}$ terms of an arithmetic progression are in geometric progression, then the common ratio of the geometric progression is

A. 1

B. 2

C. 3

D. 4

Answer: B

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17. The position vectors of vertices of $\triangle ABC$ are $(1, -2), (-7, 6)$ and $\left(\frac{11}{5}, \frac{2}{5}\right)$ respectively. The measure of the interior angle A of the $\triangle ABC$, is,

A. $(75^\circ, 90^\circ)$

B. $(60^\circ, 75^\circ)$

C. $(45^\circ, 60^\circ)$

D. $(120^\circ, 150^\circ)$

Answer: B

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18. The two circles $x^2 + y^2 = ax$ and $x^2 + y^2 = c^2 (c > 0)$ touch each other, if $\left|\frac{c}{a}\right|$ is equal to

A. 2

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

C. 1

D. None of these

Answer: C

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19. The area (in sq. units) bounded by the curve $y = |x - \pi| + |x - e|$, the ordinates at its points of non - differentiability and the x - axis is

A. $\pi + 2e$

B. $2\pi + e$

C. $(\pi - e)^2$

D. $\pi^2 - e^2$

Answer: C

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20. If z and w are complex numbers satisfying $\bar{z} + i\overline{w} = 0$ and $amp(zw) = \pi$, then $amp(w)$ is equal to (where, $amp(w) \in (-\pi, \pi]$)

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

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

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

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

Answer: A

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21. If

$$\begin{vmatrix} 2+x & x & x^2 \\ x & 2+x & x^2 \\ x^2 & x & 2+x \end{vmatrix} = \frac{1}{6}(x-a)(x-b)(x-c)(x-d)$$

an identity in x where a, b, c, d are independent of x, then the value of $\frac{13}{25}abcd$ is

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22. If

$$I = \int \frac{x^3-1}{x^5+x^4+x+1}dx = \frac{1}{4}\ln(f(x)) - \ln(g(x)) + c$$

(where, c is the constant of integration) and $f(0) = g(0) = 1$,then the value of $f(1).\, g(1)$ is equal to

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23. If $f: R \to \left[\frac{\pi}{3}, \pi\right)$ defined by $f(x) = \cos^{-1}\left(\frac{\lambda - x^2}{x^2 + 3}\right)$ is a surjective function, then λ is equal to

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24. The number of solutions of the equation $\tan x + \sec x = 2\cos x$ lying in the interval $[0, 5\pi]$ is

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25. Tangents are drawn from any point on the directrix of $y^2 = 16x$ to the parabola. If thelocus of the midpoint of

chords of contact is a parabola, then its length (in units)

of the latus rectum is