MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 22

Mathematics

1. Let $I_1 = \int_0^1 \frac{|\ln x|}{x^2+4x+1}dx$ and $I_2 = \int_1^\infty \frac{\ln x}{x^2+4x+1}dx$, then

A. $I_1 = I_2$

B. $I_1 > I_2$

C. $I_1 + I_2 = 0$

D. $I_1 = 2I_2$

Answer: A

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2. The number of positive integral solutions of the equation $\begin{vmatrix} x^3+1 & x^2y & x^2z \\ xy^2 & y^3+1 & y^2z \\ xz^2 & z^2y & z^3+1 \end{vmatrix} = 11$ is

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3. The value of the integral $\int \frac{\left(x^2 - 4x\sqrt{x} + 6x - 4\sqrt{x} + 1\right)dx}{x - 2\sqrt{x} + 1}$

A. $\frac{x^{\frac{3}{2}}}{2} + x + c$

B. $\frac{x^2}{2} - \frac{4}{3}x^{\left(\frac{3}{2}\right)} + x + c$

C. $x^{\frac{3}{2}} + \frac{x}{2} + c$

D. $\frac{2}{3}x^{\frac{3}{2}} + c$

Answer: B

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4. If the solution of the differential equation $\frac{dy}{dx} = \frac{x^3 + xy^2}{y^3 - yx^2}$ is $y^k - x^k = 2x^2y^2 + \lambda$

(where, λ is an arbitrary constant), then the value of k is

A. 2

B. 4

C. 1

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

Answer: B

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5. The number of tangents that can be drawn from (2, 0) to the curve $y = x^6$ is/are

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6. The equation $kx^2 + x + k = 0$ and $kx^2 + kx + 1 = 0$ have exactly one root in common for

A. $k = -\frac{1}{2}, 1$

B. $k = 1$

C. $k = -\frac{1}{2}$

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

Answer: C

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7. The terms $\tan 80^\circ, \tan 70^\circ + \tan 10^\circ$ and $\tan 10^\circ$ are in

A. artithmetic progression

B. geometric progression

C. harmonic progression

D. none of these

Answer: A

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8. If $a^2 + b = 2$, then maximum value of the term independent of x in the expansion of $\left(ax^{\frac{1}{6}} + bx^{-\frac{1}{3}}\right)^9$ is $(a > 0; b > 0)$

A. 48

B. 84

C. 42

D. 168

Answer: B

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9. The number of even numbers of four digits that can be formed using the digits 0, 1, 2, 3, 4 and 5 is

A. 180

B. 156

C. 144

D. 198

Answer: B

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10. If $f: R \to A$ defined as $f(x) = \tan^{-1}\left(\sqrt{4(x^2 + x + 1)}\right)$ is surjective, then A is equal to

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

B. $\left[0, \frac{\pi}{2}\right)$

C. $\left[\frac{\pi}{3}, \frac{\pi}{2}\right)$

D. $\left(0, \frac{\pi}{3}\right]$

Answer: C

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11. If the line $y = x - 1$ bisects two chords of the parabola $y^2 = 4bx$ which are passing through the point $(b, -2b)$, then the length of the latus rectum can be equal to

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12. The centre of the circule passing through the points of intersection of the curves $(2x + 3y + 4)(3x + 2y - 1) = 0$ and $xy = 0$ is

A. $\left(\frac{5}{6}, -\frac{5}{12}\right)$

B. $\left(-\frac{5}{6}, -\frac{5}{12}\right)$

C. $\left(\frac{5}{12}, -\frac{5}{6}\right)$

D. $\left(-\frac{5}{12}, \frac{5}{6}\right)$

Answer: B

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13. If $x = \sec t + \tan t$ and $y = \sec t - \tan t$, where t is a parameter, then the value of $\frac{dy}{dx}$ when $x = \frac{1}{\sqrt{3}}$ is

A. 0

B. -3

C. $\sqrt{3}$

D. $\frac{1}{\sqrt{3}}$

Answer: B

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14. Let p, q and r be three statements. Consider two compound statements $S_1 : (p \Rightarrow q) \Rightarrow r \equiv p \Rightarrow (q \Rightarrow r)$

$S_2 : (p \Leftrightarrow q) \Leftrightarrow r \equiv p \Leftrightarrow (q \Leftrightarrow r)$ State in order, whether S_1, S_2 are true of false. (where, T represents true F represents false)

A. TT

B. TF

C. FT

D. FF

Answer: C

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15. Let the equations of side BC and the internal angle bisector of angle B of ΔABC are $2x - 5y + a = 0$ and $y + x = 0$ respectively. If $A = (2, 3)$, then the value of of a is equal to

A. 4

B. 2

C. -2

D. -4

Answer: D

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16. The mean and variance of 20 observations are found to be 10 and 4 respectively. On rechecking, it was found that an observation 8 is incorrect. If the wrong observation is omitted, then the correct variance is

A. 7

B. $\frac{100}{16}$

C. $\frac{1400}{361}$

D. $\frac{1440}{361}$

Answer: D

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17. A box contains 9 slips bearing numbers $-3, -2, -1, 0, 1, 2, 3, 4 \text{ and } 5$. An experiment consists of drawing a slip from this box and replacing it back in the box after noting the number. This experiment is repeated 9 times. This experiment is repeaed 9 times. These 9 numbers are now chosen as elements of 3×3 matrix, then the probability that the matrix is skew symmetric is

A. $\frac{1}{9^6}$

B. $\frac{343}{9^9}$

C. $\frac{1}{9^9}$

D. $\frac{1}{9^7}$

Answer: B

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18. If A and B are non - singular matrices of order three such that $adj(AB) = \begin{bmatrix} 1 & 1 & 1 \\ 1 & \alpha & 1 \\ 1 & 1 & \alpha \end{bmatrix}$ and $\left|B^2 adjA\right| = \alpha^2 + 3\alpha - 8$, then the value of α is equal to

A. $\frac{9}{5}$

B. $\frac{8}{5}$

C. 3

D. 2

Answer: A

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19. If the planes $\vec{r}.\left(\hat{i} + \hat{j} + \hat{k}\right) = 1, \vec{r}.\left(\hat{i} + 2a\hat{j} + \hat{k}\right) = 2$ and $\vec{r}.\left(a\hat{i} + a^2\hat{j} + \hat{k}\right) = 3$ intersect in a line, then the possible number of real values of a is

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20. The value of $\lim_{x \to 1^-} \frac{\sqrt{\pi} - \sqrt{4\tan^{-1} x}}{\sqrt{1-x}}$ is equal to

A. $2\sqrt{\pi}$

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

C. $4\sqrt{\pi}$

D. 0

Answer: D

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21. The area (in sq. units) bounded by the curve $y = \max . \left(x^3, x^4\right)$ and the x - axis from $x = 0$ to $x = 1$ is

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22. 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 from the first point in line with the tower, it subtends an angle of 30° at the point. If the height of the tower is Hm, then the value of $\frac{H}{25\sqrt{3}}$ (in meters) is

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23. If the arguments of $(1-i)\left(\sqrt{3}+i\right)\left(1+\sqrt{3}i\right)$ and $(Z-2)\left(\overline{Z}-1\right)$ are equal, then the locus to Z is part of a circle with centre (a, b). The value of $\frac{1}{a+b}$ is

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24. Let $\vec{a}=\hat{i}+2\hat{j}+3\hat{k}$, $\vec{b}=2\hat{i}+3\hat{j}+\hat{k}$, $\vec{c}=\hat{k}+\hat{i}$ and $\left(\vec{x}\times\vec{b}\right)=\left(\vec{a}\times\vec{c}\right)\times\vec{b}$. If $\vec{x}.\vec{a}=0$, then $\left|\vec{x}\right|$ is equal to use $\sqrt{3}=1.73$)

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25. Let $f(x) = \begin{cases} a & ,x = \frac{\pi}{2} \\ \frac{\sqrt{2x-\pi}}{\sqrt{9+\sqrt{2x-\pi}}-b} & ,x > \frac{\pi}{2} \end{cases}$. If $f(x)$ is continuous at $x = \frac{\pi}{2}$, then the value of $\frac{a^2}{5b}$ is

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