MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 46

Mathematics

1. If sum o three middle terms in the expansion of $\left(k+\frac{1}{k}\right)^4$ is 23, then number of values of k is

A. 1

B. 2

C. 3

D. 4

Answer: D

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2. A value of θ for which $\frac{(2\cos\theta + i)}{(\sin\theta - 1 - I\cos\theta)}$ is purely real is

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

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

C. $-\frac{\pi}{6}$

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

Answer: C

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3. If $\begin{vmatrix} a & 1 & 1 \\ 1 & b & 1 \\ 1 & 1 & c \end{vmatrix} = 0$ where $a, b, c \neq 1$ then the value of $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$ is equal to

A. 0

B. 1

C. 2

D. -2

Answer: B

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4. Three distinct vertices are randomly selected among the vertices of a cube. The

probabiltiy that these vertices form an isosceles or equilateral triangle is

A. $\frac{3}{7}$

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

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

D. $\frac{4}{7}$

Answer: D

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5. Sum of all possible values of x which satisfy the equation $\log_3(x-3) = \log_9(x-1)$ is

A. 2

B. 5

C. 7

D. 10

Answer: B

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6. if a,b,c are in A.P. b,c,d are in G.P. and c,d,e are in H.P then a,c,e are in

A. A.P

B. G.P

C. H.P

D. None of these

Answer: B

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7. Let $A = \{1, 2, 3, 4\}$. The number of different unordered pairs (B,C) that can be formed such that $B \subseteq A, C \subseteq A$ and $B \cap C = \phi$ is

A. 3^4

B. 4^3

C. 2^4

D. 41

Answer: A

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8. The equation of the circle whose radius is 5 and which touches the circle $x^2 + y^2 \pm 2x - 4y - 20 = 0$ at the point (5,5) is

A. $x^2 + y^2 + 18x + 16y + 120 = 0$

B. $x^2 + y^2 - 18x - 16y + 120 = 0$

C. $x^2 + y^2 - 18x + 16y + 120 = 0$

D. $x^2 + y^2 + 18x - 16y + 120 = 0$

Answer: B

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9. Let P be the point of intersection of the common tangents to the parabola $y^2 = 12x$ and the hyperbola $8x^2 - y^2 = 8$.If S ad S' denote the foci of the hyperbola where S lies on the positive x-axis then P divides SS' in a ratio

A. $5:4$

B. $14:13$

C. $2:1$

D. $13:11$

Answer: A

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10. The equation of a common tangent to $y^2 = 4x$ and the curve $x^2 + 4y^2 = 8$ can be

A. $x - 2y + 2 = 0$

B. $x + 2y + 4 = 0$

C. $x - 2y = 4$

D. $x + 2y = 4$

Answer: B

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11. If the expression $2x^2 + mxy + 3y^2 \_ 5y - 2$ can be expressed as the product of two linear factors of the form $ax + by + c$ then the value of m can be

A. 5

B. 6

C. 7

D. 8

Answer: C

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12. A plane bisects the line segment joining the points (1,2,3) and (3,4,5) at right angles. Then this plane also passes through the point:

A. (1,2,-3)

B. (-1,2,3)

C. (-3,2,1)

D. (3,2,1)

Answer: C

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13. If the volume of parallelepiped formed by the vectors $\hat{i}+\lambda\hat{j}+\hat{k}$, $\hat{j}+\lambda\hat{k}$ and $\lambda\hat{i}+\hat{k}$ is minimum then $\lambda$is equal to

A. $\sqrt{3}$

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

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

D. $-\sqrt{3}$

Answer: C

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14. Consider point P with ordinate t lying on the curve $\frac{x^2}{4} - y^2 = 1, t \in N.$ If S_n

represents the minimum disance from point P to the line $2y - x = 0$, then $\lim_{t \to \infty} (tS_n)$ is

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

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

C. $\frac{1}{\sqrt{5}}$

D. $\frac{2}{\sqrt{5}}$

Answer: C

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15. Which of the following functions is differentiable at x=0?

A. $\cos(|x|) + |x|$

B. $\cos(|x|) - |x|$

C. $\sin(|x|) + |x|$

D. $\sin(|x|) - |x|$

Answer: D

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16. $\frac{dy}{dx} + y = 2e^{2x}$ then y is

A. $ce^{-x} + \frac{2}{3}e^{2x}$

B. $(1+x)e^{-x} + \frac{2}{3}e^{2x} + c$

C. $ce^{-x} = \frac{2}{3}e^{2x} + c$

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

Answer: A

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17. $\int \log 2x dx$ is

A. $x \log 2x - \frac{x^2}{2}$

B. $x \log 2x - \frac{x}{2}$

C. $x^2 \log 2x - \frac{x}{2}$

D. $x \log 2x - x + c$

Answer: D

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18. If $2 \sec 2a = \tan b + \cot b$ then one of the values of $(\alpha + \beta) =$

A. π

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

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

D. None of these

Answer: C

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19. Number of real root (s) of equation x^2 and $x = 1$ betwwen $-\frac{3\pi}{2}$ and $\frac{\pi}{2}$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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20. The number of solution of the equation $2\tan^{-1}x + \cot^{-1}x = \frac{7\pi}{6}$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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21. Let A be the matrix of order 3×3 such that $\det(A) = 2, B = 2A^{-1}$ and $C = \frac{(adjA)}{\sqrt[3]{16}}$,

then $\det\left(A^3B^2C^3\right) =$

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22. Suppose

$$f(x) = \begin{cases} x^3 - x^2 + 10x - 5 & x \leq 1 \\ -2x + \log_2\left(b^2 - 2\right) & x > 1 \end{cases}$$

If f(x) attain highest value at x=1,

for $b^2 \in (2, \lambda)$ then $\frac{\lambda}{65}$ is

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23. If $f(x) = (\log_{\cot x} \tan x)$

$. (\log_{\tan x} \cot x)^{-1}$

$+\tan^{-1}\left(\frac{x}{\sqrt{4-x^2}}\right), x \in (-2, 2)$ the the value of $f'(0) =$ .....

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24. The value of $\int_0^{\pi/2} \frac{\cos 3x + 1}{2\cos x - 1} dx =$ .....

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25. The mean and variance of 7 observations are 8 and 16 respectively. If 5 of the observations are 2,4,10,12,14 and the remaining two observations are x and y then the value of xy is

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26. Let C_1 and C_2 be two curves given by

$C_1 : y = \log_e(x + e)$

$C_2 : x = \log_e\left(\frac{1}{y}\right).$

Find the area enclosed (in sq. units) by the curves and the x-axis.

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27. There are point $P(p, q)$ on the graph of $f(x) = x^2$ nad a point $Q(r, s)$ on the graph of $g(x) = -\frac{8}{x}$ where $p > 0$ and$r > 0$. If the line through P and Q is also tangen to both the curves at these points respectively, then the sum of abscissa of P and Q is

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28. Let $f: R \to R$ to be a polynomial function satisfying the equation

$f(f(x) - 2y) = 2x - 3y$

$+ f(f(y) - x), \forall x, y \in R$ then the value of $f(9) - f(3)$ is equal to

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29. The number of values of x such hat the three terms $x, [x], \{x\}$ are in H.P Where [.],{.}

represents greatest integer function and fractional part function respectively, is/are

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30. The shortest distance between the skew lines $\frac{x+3}{-4}=\frac{y-6}{3}=\frac{z}{2}$ and $\frac{x+2}{-4}=\frac{y}{1}=\frac{z-7}{1}$ is

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