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India's Number 1 Education App

MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 124

Mathematics

1. In the expansion of $\left[\sqrt{\left(\frac{x}{3}\right)}+\frac{\sqrt{3}}{x^2}\right]^{10}$, the constant term is ____

A. $\frac{5}{3}$

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

C. 6

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

Answer: A

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2. The number of point(s) of minima of the polynomial $y = 10x^6 - 24x^5 + 15^4 - 40x^2 + 108$ is(are) equal to _____

A. 1

B. 2

C. 3

D. 4

Answer: B

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3. How many 5-digit telephone numbers can be formed using the digits 0 to 9, if each number starts with 67 and repetition is not allowed.

A. 334

B. 336

C. 338

D. 348

Answer: B

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4. The system of linear equations

$x + y + z = 1,$

$x + 2y + 4z = \lambda, x + 4y + 10z = \lambda^2$ has a solution if it satisfies the following

A. $\lambda = -1$

B. $\lambda \neq 1$

C. $\lambda = 2$

D. $\lambda \in \phi$

Answer: C

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5. If there exists a plane containing the lines $\frac{x-1}{1}=\frac{y-1}{2}=\frac{z-1}{3}$ and $\frac{x-1}{1}=\frac{y-1}{3}=\frac{z-1}{5}$. Then which o the following is the equation of the plane :

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

B. $x+2y+3z=3$

C. $x-2y+z=0$

D. $x+2y+z=4$

Answer: C

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6. If $f(x) = \frac{\sin 3x}{\sin x}, x \neq n\pi,$ then number of integers in the range of f(x) is

A. 5

B. 4

C. 3

D. 2

Answer: C

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7. If the latus rectum of a hyperbola through one focus, subtends an angle 60° at the other focus, then its

eccentricity is _____

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\sqrt{5}$

D. $\sqrt{6}$

Answer: B

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8. Let $g(x) = |x - 2|$ and $h(x) = g(g(x))$, then find the value of the expression

$h'(-1) + h'(1) + h'(3) + h'(5)$ (where denotes derivative).

A. 2

B. -1

C. 0

D. 1

Answer: C

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9. The probability of getting a score of exactly 9 twice when a pair of fair dice is thrown independently three times. is

A. $\frac{8}{729}$

B. $\frac{8}{243}$

C. $\frac{1}{729}$

D. $\frac{8}{9}$

Answer: B

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10. The void relation on a set A is

A. Reflexive

B. Symmetric and transitive

C. Reflexive and symmetric

D. Reflexive and transitive

Answer: B

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11. The function $f: R \to R$ defined by $f(x) = |x|$ is :

A. One-one only

B. Onto only

C. Both one-one and onto

D. Neither one-one nor onto

Answer: D

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12. Statement 1: The range of the function $y = \frac{ax + b}{cx + d}$ $(ad - bc \neq 0)$ does not include the value $\frac{a}{c}$.

Statement 2: The domain of the function $g(y) = \frac{b - dy}{cy - a}$ does not include the value $\frac{a}{c}$.

A. Statement 1 is true, statement 2 is true, statement 2 is not the correct explanation for statement 1

B. Statement 1 is true, statement 2 is false.

C. Statement 1 is false, statement 2 is true.

D. Statement 1 is true, statement 2 is true, statement 2 is the correct explanation for statement 1

Answer: D

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13. Lagrange's mean value theorem is not applicable to which of the following functions in the interval [1, 3] (where [.] represents greatest integer function) :

A. $f(x) = \begin{cases} (x-1)^2, & x \leq 2 \\ 2x-3, & x > 2 \end{cases}$

B. $f(x) = \begin{cases} \left|x - \frac{3}{2}\right|, & x \leq 2 \\ x, & x > 2 \end{cases}$

C. $f(x) = |x|$

D. $f(x) = \left[\frac{x}{4}\right]$

Answer: B

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14. Which of the following options is most relevant?

Statement 1: The tangents drawn to a parabola at points (1, 2) and (3, 4) intersect at the point (-2, -3). The slope of the axis of the parabola is $\frac{3}{2}$.

Statement 2: The line joining the points of intersection of tangents and normals at the extremities of the focal chord of a parabola is parallel to the axis of the parabola.

A. Statement 1 is true, Statement 2 is true , Statement 2 is the correct explanation for Statement 1

B. Statement 1 is true, Statement 2 is true, Statement 2 is NOT the correct explanation for Statement 1

C. Statement 1 is true, Statement 2 is false

D. Statement 1 is false, Statement 2 is true

Answer: B

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15. The value of the integral $\int \frac{\text{cosec x}}{\cos^2\left(1+\log\tan\frac{x}{2}\right)}dx$ is equal to (where, c is the constant of integration)

A. $\sin^2\left[1+\log\tan\frac{x}{2}\right]+c$

B. $\tan\left[1+\log\tan\frac{x}{2}\right]+c$

C. $\sec^2\left[1+\log\tan\frac{\pi}{2}\right]+c$

D. $-\tan\left[1+\log\tan\frac{\pi}{2}\right]+c$

Answer: B

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16. Find the value of $\int_0^{2\pi} \sin^4 x dx$

A. $2\int_0^{\pi} \sin^4 x dx$

B. $8\int_0^{\frac{\pi}{4}} \sin^4 x dx$

C. $-4\int_0^{\frac{\pi}{2}} \cos^4 x dx$

D. $3\int_0^{\frac{2\pi}{0}} \sin^4 x dx$

Answer: A

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17. An arc of a bridge is semi-elliptical with major axis horizontal. If the length of the base is 9 m and highest part of the bridge is 3 m from the base, then what will be the best approximation of the height of the arch 2 m from the centre of the base?

A. $\frac{11}{4}m$

B. $\frac{8}{3}m$

C. $\frac{7}{2}m$

D. $2m$

Answer: B

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18. Suppose L be the line which lies in the family of straight lines

$(a+2b)x+(a-3b)y+a-8b=0, a, b \in R,$

which is farthest from the point (2, 2), then find the area enclosed by the line Land the coordinate axes

A. $\frac{4}{3}$ sq. units

B. $\frac{9}{2}$ sq. units

C. $\frac{49}{8}$ sq. units

D. $\frac{11}{2}$ sq. units

Answer: C

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19. If $\frac{dy}{dx} = \frac{xy}{x^2 + y^2}, y(1) = 1$ and $y(x_0) = e,$ then $x_0 =$ _____

A. $\sqrt{3e}$

B. $\sqrt{3}e$

C. $\sqrt{2(e^2 - 1)}$

D. e

Answer: B

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20. If the quadratic equations

$k(6x^2 + 3) + rx + 2x^2 - 1 = 0$ and

$6k\left(2x^2+1\right)+px+4x^2-2=0$

have both the roots common, then $2r-p$ is equal to

A. 0

B. 1

C. 2

D. None of these

Answer: A

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21. If $p=\frac{3}{4}+\frac{3.5}{4.\ 8}+\frac{3.5.7}{4.8.12}+\ldots\infty,$ find $p^2+2p-4.$

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22. If one of the roots of the equation $6x^2 + kx + 6 = 0, k > 0,$ is square of the other, then find the value of k

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23. Let $a_1, a_2, a_3, \ldots$ be A.P. and $g_1, g_2, g_3, \ldots$ be in G. P. If $a_1 = g_1 = 3$ and $a_8 = g_4 = 24,$ then find $\frac{g_7}{a_4}$.

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24. If $|x + 4|^2 - |z - 4|^2 = 8,$ then find Re (z)

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25. Evaluate $\lim_{x \to 0} \frac{x \tan 2x - 2x \tan x}{(1 - \cos 2x)^2}$

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26. If $\int \frac{dx}{5 + 4\cos x} = \frac{m}{n} Arc\tan\left[\frac{p}{q}\left(g\left(\frac{x}{2}\right)\right)\right]$ then + x the value of $g\left(\frac{qm\pi}{8pn}\right)$ is :

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27. The area bounded by the curves

$y = \ln x, y = \ln|x|, y = |\ln x|$ and $y|\ln|x|| \quad |$, for $x \in (-1, 1)$ is (in sq. units)

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28. If $\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{2}{3x}\right)+\tan^{-1}\left(\frac{3}{4}\right)=\frac{\pi}{2}$, then the value of $\sin\left(\pi-2\tan^{-1}x\right)$ is $\frac{m}{n}$, where m and n are natural numbers, n coprime to each other, then (n + m) is

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29. A circle touching both the coordinates axes, having centre in the first quadrant and also touching the line $4x+3y=12$ is given by $x^2+y^2-2cx-2xy+c^2=0$. Find the sum of all possible values of c.

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30. Two teams A and B have the same mean and their coefficients of variations are 6, 2 respectively. If σ_A, σ_B are the standard deviations of teams A, B respectively. Evaluate λ if $\sigma_A = \lambda\sigma_B$.

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