

MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 72

Mathematics

1. Let f(x) be a derivable function at x = 2 and $\lim_{h \to 0} \frac{f(2+h)}{\sin h} = 3$, then $\frac{f(2) + f'(2)}{f(2) - f'(2)}$ is equal to A. 0 B. 1 C. 3

 $\mathsf{D}.-1$



2.

The equation $(5x-1)^2 + (5y\!\!-\!2)^2 = ig(\lambda^2\!\!-\!4\lambda + 4ig)(3x + 4y - 1)^2$ represents an ellipse if $\lambda \in$

- A. (0, 1] B.(-1,2)C. (2, 3)
- D. (-1, 0)

Answer: C

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3. For any two statements p and q, which of the following is true

A. ~ $(p \leftrightarrow \ extsf{-}q)$ is a tautology

B. ~ $(p \leftrightarrow ~q)$ is a contradiction

C. ~ $(p \leftrightarrow \neg q)$ is equivalent to $p \leftrightarrow q$

D. ~ $(p \leftrightarrow \neg q)$ is equivalent to $\neg p \leftrightarrow q$

Answer: C

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4.

If

$$a_1x^3+b_1x^2+c_1x+d_1=0 \,\,\, {
m and}\,\,\, a_2x^3+b_2x^2+c_2x+d_2=0$$

have a pair of common positive repeated roots. If the value of

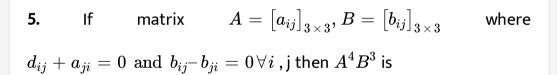
$$egin{array}{cccc} 3a_1 & 2b_1 & c_1 \ 3a_2 & 2b_2 & c_2 \ a_2b_1-a_1b_2 & c_1a_2-c_2a_1 & d_1a_2 \ & -a_2d_2 \end{array} ert$$
 is

A. 3	
B. 2	
C. 1	

D. 0

Answer: D

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A. Singular matrix Correct Answer

B. Zero matrix

C. Symmetric matrix

D. Skew symmetric matrix

Answer: A

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6. Let P a point on $y^2 = 4x$ such that its focal distance is 4. Let T be the point of intersection of tangents drawn at P and vertex of the parabola. If S is focus and 'R' is an interior point on the axis of the parabola at a distance 4 unit from S, then area of quadrilateral PRST is equal to

A. $3\sqrt{3}$

B. $4\sqrt{3}$

C. $6\sqrt{3}$

D. $5\sqrt{3}$

Answer: C

7. The angle between the asymptotes of a hyperbola is 30° . The eccentricity of the hyperbola is

A. $\sqrt{2} \pm \sqrt{3}$ B. $\sqrt{3} \pm \sqrt{5}$ C. $\sqrt{2 \pm 4\sqrt{3}}$ D. $\sqrt{7} \pm \sqrt{2}$

Answer: C

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8. A coin is tossed 7 times, Then probability that at least 4 consecutive heads appear is

A.
$$\frac{3}{16}$$

B.
$$\frac{5}{32}$$

C. $\frac{1}{8}$
D. $\frac{1}{4}$



9. The slope of the tangent to the curve represented by $x=t^2\!-3t+1$ & $y=2t^2+3t-4$ at the point $M(\,-1,\,10)$ is :

A. 9

 $B.\,10$

C. 11

 $\mathsf{D}.\,12$

Answer: C

10. If \overrightarrow{c} is directed along the internal bisector of the angle between the vectors $\overrightarrow{a} = 7\hat{i}-4\hat{j}-4\hat{k}$ and $\overrightarrow{b} = -2\hat{i}-\hat{j}+2\hat{k}$ with $\left|\overrightarrow{c}\right| = 5\sqrt{6}$, then \overrightarrow{c} is A: $\frac{5}{2}(\hat{i}-7\hat{j}+2\hat{k})$

A.
$$\frac{1}{3}(i - 7j + 2k)$$

B. $\frac{5}{3}(5\hat{i} + 5\hat{j} + 2\hat{k})$
C. $\frac{5}{3}(\hat{i} + 7\hat{j} + 2\hat{k})$
D. $\frac{5}{3}(-5\hat{i} + 5\hat{j} + 2\hat{k})$

Answer: A



11. If the largest value of the $\lim_{x \to \infty} \left(1 + \frac{a}{x}\right)^{\frac{x}{b}}$ where a, b lies in the interval $\left[\frac{1}{5}, 403\right]$ is e^{λ} , then λ equals

A. 2015

B. 2016

C. 2017

D. 2018

Answer: A

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12. If Rolle's theorem can be applied to f (x) = xlnx, x > 0 in interval

$$\left[\displaystylerac{1}{a}, \displaystylerac{1}{b}
ight]$$
 where $a, b \in I^+$ then b equals

A. 1

B. 2

C. 3

D. infinite possible values exist

Answer: B

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13.
$$\int e^{\sec x} (\tan^2 x + \cos x) dx$$
 is equal to [Note: Where C is a

constant of integration]

A.
$$e^{\sec x} \cdot \sin x + C$$

B. $e^{\sec x} \cdot \cos x + C$

 $\mathsf{C}.\,e^{\sec x}.\,\tan x+C$

D. $e^{\sec x}$. $\cot x + C$

Answer: A

14. The value of
$$rac{\sum_{i=1}^{44} \cos(i^\circ)}{\sum_{i=1}^{44} \sin(i^\circ)} - rac{\sum_{i=1}^{44} \sin(i^\circ)}{\sum_{i=1}^{44} \cos(i^\circ)}$$
 is equal to

- B. 2
- C. 3
- D. 4



15. The area bounded by the curve $y = x^2 + 4x + 5$, the axes of co ordinates and the minimum ordinate is

A.
$$3\frac{2}{3}$$
 sq.units
B. $4\frac{2}{3}$ sq.units
C. $5\frac{2}{3}$ sq.units
D. $\frac{8}{3}$ sq.units



16. The number of solutions of $\sec^2\theta\csc^2\theta + 2\csc^2\theta = 8, 0 \le \theta$ is $\le \pi/2$ A. 4 B. 3 C. 0

D. 2

Answer: D



17.

$$egin{aligned} f(x) &= 7 \sin^{-1} igg(rac{2x}{1+x^2}igg) + 5 \cos^{-1} igg(rac{1-x^2}{1+x^2}igg) - 4 an^{-1} igg(rac{2x}{1-x^2}igg) \ \end{aligned}$$
 then $orall x \in ig(1,\sqrt{3}ig), f(x)$ is

Let

A.
$$11\pi+12 an^{-1}x$$

B.
$$11(\pi - \tan^{-1} x)$$

C.
$$11\pi - 12 \tan^{-1} x$$

D. None

Answer: C

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18. Let \overline{X} and M.D. be the mean and the mean deviation about \overline{X} of n observations $x_i \forall i = 1, 2, 3, ..., n$. If each of the observations is increased by 5, then the value of new mean and the mean deviation about the new mean respectively, are

A. \overline{X} + 5, M. D. B. \overline{X} + 5, M. D. + 5 C. \overline{X} , M. D. + 5 D. \overline{X} , M. D.

Answer: A

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19. If a curve passing through (1, 2) satisfies the differential equation y(1 + xy)dx - xdy = 0, then which of the following is true?

A.
$$f(x)=rac{2x}{2-x^2}$$

$$egin{aligned} \mathsf{B.}\,f(x) &= rac{x+1}{x^2+1} \ \mathsf{C.}\,f(x) &= rac{x-1}{4-x^2} \ \mathsf{D.}\,f(x) &= rac{4x}{1-2x^2} \end{aligned}$$

Answer: A



20. Relation R defined in set of real numbers by $R=\left\{(a,b)\colon a\leq b^3
ight\}$ is

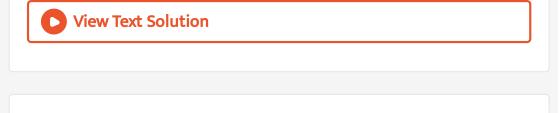
A. Reflexive

B. Symmetric

C. Transitive

D. None of these

Answer: D



21. 20 lines are drawn in a plane. No two lines are parallel and no three are concurrent. Find the number of disjoint parts these lines divide the plane into.

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22. If the minimum value of the function $f(x)=8^{\sin^{-1}x}+8^{\cos^{-1}x}$ is m, then the value of $(\sec(\log_2 m-1))^8$ is equal to

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23. Find the value of n, if the sum of the coefficients of $1^{st}, 2^{nd}$ and 3^{rd} terms in the expansion of $\left(x-rac{3}{x^2}
ight)^n, x
eq 0n \in N$ is 559

24. Let f (x) be a function defined as $f: R \to R$ such that f (x + 2) + f (x-2) = f (a) and f (1) = 3 then the value of the expression $\sum_{r=0}^{15} f(1+12r)$ is equal to

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25. OABC is a tetrahedron in with O as the origin and position vectors of points A, B, C as $\hat{i} + 2\hat{j} + 3\hat{k}$, $2\hat{i} + \alpha\hat{j} + \hat{k}$ and $\hat{i} + 3\hat{j} + 2\hat{k}$ respectively, then the integral value of α to have shortest distance between \overrightarrow{OA} & \overrightarrow{BC} as $\sqrt{\frac{3}{2}}$, is

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26. Let $z_1 = 10 + 6i$ and $z_2 = 4 + 6i$. If z is any complex number such that the argument of 1 is , then the value of $\frac{z - z_1}{z - z_2}$ is $\frac{\pi}{4}$ then the value of [|z - 7 - 9i|] (where [.] is greatest integer function).



27. If Ω_1 be a circle with centre and diameter AB & P be a point on the segment OB. Suppose another circle Ω_2 with centre P lies in the interior of 121. Tangents are drawn from A and B to the circle Ω_2 intersecting Ω_1 again at A_1 and B_1 respectively such that A_1 and B_1 are on the opposite sides of AB. Given that $A_1B = 5$, $AB_1 = 15$ and OP = 10, If r is the radius of Ω_1 Then $\left[\frac{r}{10}\right]$ equals **28.** The equations of altitudes of a triangle are given as x + y = 0, x - 4y = 0 and 2x - y = 0. If the locus of the centroid of this triangle is ax + by = 0 (where a and b are positive integers and coprime to each other) and one of its vertex has the coordinates $(-\lambda, \lambda)$, then the value of (a + 2b) is



29. The set of values of 'c' for which the equation: x^3-6x^2+3x-c is of the form $(x-a)^2(x-eta), [lpha, eta\in R]$ is {a,b} then find the value of a + b

