



## MATHS

### BOOKS - NTA MOCK TESTS

#### NTA JEE MOCK TEST 33

#### Mathematics

1. Let  $f(x) = \max \{ \tan x, \cot x \}$ . Then the number of roots of the equation  $f(x) = \frac{1}{2}$  in  $(0, 2\pi)$  is

A. 0

B. 1

C. 2

D. 4

**Answer: A**



Watch Video Solution

2. If set

$A = \{x : \tan x = \sec x, x \in [0, 4\pi]\}$  and set  $B = \{x : \sin^2 x = 1, x \in [0, 4\pi]\}$ , then

A.  $A \subset B$

B.  $A = B$

C.  $A \cap B = B$

D.  $n(A \times B) = 0$

**Answer: D**



Watch Video Solution

3. The number of eight - digit integers, with the sum of digits equal to 12 and formed by using of digits 1, 2 and 3 only are

A. 255

B. 277

C. 288

D. 266

**Answer: D**



[Watch Video Solution](#)

4. The mean and standard deviation of 10 observations  $x_1, x_2, x_3, \dots, x_{10}$  are  $\bar{x}$  and  $\sigma$  respectively. Let 10 is added to  $x_1, x_2, \dots, x_9$  and 90 is subtracted from  $x_{10}$ . If still, the standard deviation is the same, then  $x_{10} - \bar{x}$  is equal to

A. 35

B. 45

C. 55

D. 50

**Answer: B**



[Watch Video Solution](#)

5. If  $\alpha, \beta$  be the roots of  $4x^8 - 16x + c = 0, c \in R$  such that  $1 < \alpha < 2$  and  $2 < \beta < 3$ , then the number of integral values of  $c$  is

A. 2

B. 3

C. 4

D. 5

**Answer: B**



[Watch Video Solution](#)

6. A pole stands vertically in the center of a square. When  $45^\circ$  is the elevation of the sun, the tip of its shadow just reaches the side of the

square and is at a distance of 30 meters and 40 meters from the ends of that side. The height of the pole is

- A. 50 meters
- B. 25 meters
- C.  $25\sqrt{2}$  meters
- D.  $50\sqrt{2}$  meters

**Answer: C**



**Watch Video Solution**

7. If the area bounded by  $y = x$ ,  $y = \sin x$  and  $x = \frac{\pi}{2}$  is  $\left(\frac{\pi^2}{k} - 1\right)$  sq. units then the value of  $k$  is equal to

- A. 2
- B. 3
- C. 6

D. 8

**Answer: D**



[Watch Video Solution](#)

8. A bag contains 10 white and 3 black balls. Balls are drawn one-by-one without replacement till all the black balls are drawn. The probability that the procedure of drawing balls will come to an end at the seventh draw, is

A.  $\frac{15}{286}$

B.  $\frac{105}{286}$

C.  $\frac{35}{286}$

D.  $\frac{7}{286}$

**Answer: A**



[Watch Video Solution](#)

9. Consider the function  $f(x) = (x^3 - x)|x^2 - 6x + 5|$ ,  $\forall x \in R$ , then

$f(x)$  is

- A. discontinuous at  $x = 1$
- B. discontinuous at  $x = 5$
- C. non differentiable at  $x = 1$
- D. non differentiable at  $x = 5$

**Answer: D**

 [Watch Video Solution](#)

10. The solution of the differential equation  $\frac{dy}{dx} + xy \ln y = x^3 y$  is equal to (where,  $C$  is the constant of integration)

- A.  $\ln y = x^2 + Ce^{-x^2}$
- B.  $\ln y = x^2 - 2 + Ce^{-x^2}$
- C.  $\ln y = x^2 - 2 + ce^{-\frac{x^2}{2}}$

$$D. \ln y = x^2 + Ce^{-\frac{x^2}{2}}$$

**Answer: C**



**Watch Video Solution**

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

A. 0

B. 3

C. 2

D. 1

**Answer: D**



**Watch Video Solution**



12. The first three terms of a geometric progression are 3, -1 and  $\frac{1}{3}$ . The next term of the progression is

A. 2

B. -2

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

D.  $\frac{-5}{9}$

**Answer: C**



[Watch Video Solution](#)

13. Let  $P = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 16 & 4 & 1 \end{bmatrix}$  and  $I$  be the identity matrix of order 3. If

$Q = [q_{ij}]$  is a matrix, such that  $P^{50} - Q = I$ , then  $\frac{q_{31} + q_{32}}{q_{21}}$  equals

A. 52

B. 103

C. 201

D. 205

**Answer: B**



[Watch Video Solution](#)

14. The plane  $2x-2y+z=3$  is rotated about its line of intersection with the  $x$ - $y$  plane by an acute angle  $\alpha$ . If the new position of the plane contains the point  $(3,1,1)$  then the value of  $\cos\alpha=$

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

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

C.  $\frac{7}{9}$

D.  $\frac{4}{9}$

**Answer: C**



[Watch Video Solution](#)

15. Two tangents are drawn from a point  $(-4, 3)$  to the parabola  $y^2 = 16x$ . If  $\alpha$  is the angle between them, then the value of  $\cos \alpha$  is

A. 0

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

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

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

**Answer: A**



[Watch Video Solution](#)

16. The integral  $I = \int 2^{(2^x + x)} dx = \lambda \cdot (2^{2^x}) + C$  (where,  $C$  is the constant of integration). Then the value of  $\sqrt{\lambda}$  is equal to

A.  $\frac{1}{\ln 4}$

B.  $\frac{1}{(\ln 2)^2}$

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

D.  $\frac{1}{(\ln 4)^2}$

**Answer: C**



**Watch Video Solution**

17. The function  $y = x^4 - 8x^3 + 22x^2 - 24x + 10$  attains local maximum of minimum at  $x = a$ ,  $x = b$  and  $x = c$  ( $a < b < c$ ). Then a, b and c are in

- A. Geometric progression
- B. Harmonic progression
- C. Arithmetic progression
- D. none of these

**Answer: C**



**Watch Video Solution**

18. The radius of the circle touching the line  $x + y = 4$  at  $(1, 3)$  and intersecting  $x^2 + y^2 = 4$  orthogonally is

A.  $\frac{3\sqrt{2}}{4}$  units

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

C.  $\frac{3}{\sqrt{2}}$  units

D.  $\frac{4\sqrt{2}}{3}$  units

**Answer: A**



[Watch Video Solution](#)

19. The value of the integral  $\int_{-3\pi}^{3\pi} |\sin^3 x| dx$  is equal to

A.  $\pi$

B.  $8\pi$

C. 1

D. 8

**Answer: D**



[Watch Video Solution](#)

20. Let B and C are points of interection of the parabola  $y = x^2$  and the circle  $x^2 + (y - 2)^2 = 8$ . The area of the triangle OBC, where O is the origin, is

A. 2

B. 4

C. 6

D. 8

**Answer: D**



[Watch Video Solution](#)

21. The value of  $\lim_{x \rightarrow 0} \left( \frac{1}{x^{18}} \right) \left( 1 - \cos\left(\frac{x^3}{3}\right) - \cos\left(\frac{x^6}{6}\right) + \cos\left(\frac{x^3}{3}\right) \cdot \cos\left(\frac{x^6}{6}\right) \right) \lambda^2$ , then the value of  $900\lambda$  is equal to (here,  $\lambda > 0$ )

 [Watch Video Solution](#)

22. The equation  $\text{Im}\left(\frac{iz - 2}{z - i}\right) + 1 = 0$ ,  $z \in C$ ,  $z \neq i$  represents a part of a circle having radius equal to 4

 [Watch Video Solution](#)

23. In the expansion of  $(ax + b)^{2020}$ , if the coefficient of  $x^2$  and  $x^3$  are equal, then the value of  $\frac{9}{100} \left(\frac{b}{a}\right)$  is equal to

 [Watch Video Solution](#)

24. If A is an invertible matrix of order 3 and B is another matrix of the same order as of A, such that  $|B| = 2$ ,  $A^T|A|B = A|B|B^T$ . If

$\left| AB^{-1} \text{adj}(A^T B)^{-1} \right| = K$ , then the value of  $4K$  is equal to



[Watch Video Solution](#)

25. If the line segment joining  $P(2, 3)$  and  $Q(5, 7)$  subtends a right angle at  $R(x, y)$  and the area of  $\Delta PQR = 2$  sq. units, then the maximum number of such points  $R$  in  $xy$ -plane are



[Watch Video Solution](#)