



# MATHS

## BOOKS - NTA MOCK TESTS

### NTA JEE MOCK TEST 36

#### Mathematics

1. The relation  $R$  given by

$$\{(x, y) : x^2 - 3xy + 2y^2 = 0, \forall x, y \in R\}$$
 is

A. reflexive but not symmetric

B. symmetric but not transitive

C. symmetric and transitive

D. an equivalence relation

**Answer: A**



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2. If  $I_n = \int (\ln x)^n dx$ , then  $I_{10} + 10I_9$  is equal to

(where  $C$  is the constant of integration)

A.  $x(\ln x)^{10} + C$

B.  $10(\ln x)^9 + C$

C.  $9(\ln x)^{10} + C$

D.  $x(\ln x)^9 + C$

**Answer: A**



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3. If  $p$  and  $q$  are two logical statements, then  $p \Rightarrow (q \Rightarrow p)$  is equivalent to

A.  $p \Rightarrow (p \Rightarrow q)$

B.  $p \Rightarrow (p \vee q)$

C.  $p \Rightarrow (p \wedge q)$

D.  $p \Rightarrow (p \Leftrightarrow q)$

**Answer: B**



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4. Let  $\alpha$  and  $\beta$  be the roots of the equation  $x^2 + ax + 1 = 0$ ,  $a \neq 0$ . Then the equation whose roots are  $-\left(\alpha + \frac{1}{\beta}\right)$  and  $-\left(\frac{1}{\alpha} + \beta\right)$  is

A.  $x^2 = 0$

B.  $x^2 - 2ax + 4 = 0$

C.  $x^2 - 2ax + 4 = 0$

D.  $x^2 - ax + 1 = 0$

**Answer: C**



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5. The value of the expression

$$1 + \operatorname{cosec} \frac{\pi}{4} + \operatorname{cosec} \frac{\pi}{8} + \operatorname{cosec} \frac{\pi}{16} \text{ is equal to}$$

A.  $\cot. \frac{\pi}{8}$

B.  $\cot. \frac{\pi}{16}$

C.  $\cot. \frac{\pi}{32}$

D.  $\operatorname{cosec}^2. \frac{\pi}{16}$

**Answer: C**



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6. Let  $\vec{p} = 2\hat{i} + \hat{j} - 2\hat{k}$ ,  $\vec{q} = \hat{i} + \hat{j}$ . If  $\vec{r}$  is a vector such that  $\vec{p} \cdot \vec{r} = |\vec{r}|$ ,  $|\vec{r} - \vec{p}| = 2\sqrt{2}$  and the angle between  $\vec{p} \times \vec{q}$  and  $\vec{r}$  is  $\frac{\pi}{6}$ , then the value of  $\left| (\vec{p} \times \vec{q}) \times \vec{r} \right|$  is equal to

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

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

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

D. 3

**Answer: A**



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7. The solution of the differential equation  $x \cos y \frac{dy}{dx} + \sin y = 1$  is (Here,  $x > 0$  and  $\lambda$  is an arbitrary constant)

A.  $x - x \cos x = \text{lamdba}$

B.  $x + x \cos x = \lambda$

C.  $x - x \sin y = \lambda$

D.  $x + x \cos y = \lambda$

**Answer: C**



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8.

Let

$$|z_1| = 1, |z_2| = 2, |z_3| = 3 \text{ and } z_1 + z_2 + z_3 = 3 + \sqrt{5}i$$

, then the value of  $\operatorname{Re}(z_1\bar{z}_2 + z_2\bar{z}_3 + z_3\bar{z}_1)$  is equal to

(where  $z_1, z_2$  and  $z_3$  are complex numbers)

A. 1

B. -1

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

D. 0

**Answer: D**



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9. If from the top of a tower 80 meters high the angles of depression of the top and bottom of a house are  $30^\circ$  and  $45^\circ$  respectively, then the height of the house is

A.  $40\sqrt{3}$  meters

B.  $40 \left( \frac{\sqrt{3} - 1}{\sqrt{3}} \right)$  meters

C.  $80 \left( \frac{\sqrt{3} - 1}{\sqrt{3}} \right)$  meters

D.  $40 \left( \frac{\sqrt{3} + 1}{\sqrt{3}} \right)$  meters

**Answer: C**



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10. The radius of circle, touching the parabola  $y^2 = 8x$  at  $(2, 4)$  and passing through  $(0, 4)$ , is

A. 1 unit

B. 2 units

C.  $\sqrt{2}$  units

D.  $\sqrt{3}$  units

**Answer: C**



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11. Distance between two non - intersecting planes

$P_1$  and  $P_2$  is 5 units, where  $P_1$  is

$2x - 3y + 6z + 26 = 0$  and  $P_2$  is

$4x + by + cz + d = 0$ . The point  $A(-3, 0, -1)$  lies

between the planes  $P_1$  and  $P_2$ , then the value of

$3b + 4c - 5d$  is equal to

A. 580

B. 120

C.  $-18$

D.  $-120$

**Answer: B**



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12. Let  $Z = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 1 & 2 \\ 3 & 1 & 0 \end{bmatrix}$  and  $P = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 0 & 1 \end{bmatrix}$ . If

$Z = PQ^{-1}$ , where  $Q$  is a square matrix of order 3,

then the value of  $Tr((adjQ)P)$  is equal to (where

$Tr(A)$  represents the trace of a matrix  $A$  i.e. the sum

of all the diagonal elements of the matrix  $A$  and  $adjB$

represents the adjoint matrix of matrix  $B$ )

A. 3

B.  $-1$

C. 4

D.  $\frac{6}{5}$

**Answer: B**



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13. The sum of 10 terms of the series

$$1 + 2(1.1) + 3(1.1)^2 + 4(1.1)^3 + \dots \text{ is}$$

A. 85.12

B. 92.5

C. 96.5

D. 100

**Answer: D**



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14. The coefficient of  $x^4$  in the expansion of  $(1 + x + x^2)^6$  is

- A. 72
- B. 90
- C. 96
- D. 112

**Answer: B**



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15. The tangent at any point on the curve  $xy = 4$  makes intercepts on the coordinates axes as  $a$  and  $b$ . Then

the value of  $ab$  is

A. 8

B. 16

C. 32

D. 64

**Answer: B**



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**16.** The number of ways in which 10 boys can be divided into 2 groups of 5, such that two tallest boys are in two different groups, is equal to

A. 70

B. 35

C. 252

D. 126

**Answer: A**



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17. The value of  $\int_3^6 \frac{\sqrt{(36 - x^2)^3}}{x^4} dx$  is equal to

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

B.  $\frac{\pi}{6}$



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

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

**Answer: C**



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**18.** The line  $(K + 1)^2x + Ky - 2K^2 - 2 = 0$  passes through the point  $(m, n)$  for all real values of  $K$ , then

A.  $m + n = 2$

B.  $m - n = 6$

C.  $\frac{m}{n} = 2$

D.  $\frac{m}{n} = \frac{1}{2}$

**Answer: B**



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**19.** If  $A$  and  $B$  are non-singular matrices of order  $3 \times 3$ , such that  $A = (\text{adj}B)$  and  $B = (\text{adj}A)$ , then  $\det(A) + \det(B)$  is equal to (where  $\det(M)$  represents the determinant of matrix  $M$  and  $\text{adj} M$  represents the adjoint matrix of matrix  $M$ )

A. 1

B. 2

C. 3

D. 4

**Answer: B**



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**20.** Line  $L_1 \equiv 3x - 4y + 1 = 0$  touches the circles  $C_1$  and  $C_2$ . Centres of  $C_1$  and  $C_2$  are  $A_1(1, 2)$  and  $A_2(3, 1)$  respectively, then identify the **INCORRECT** statement from the following statements.

A.  $L_1$  is direct common tangent of these circles

B.  $L_1$  is transverse common tangent to these circles

C. Radius of circle  $C_1$  is  $\frac{4}{5}$  units

D. Radius of circle  $C_2$  is  $\frac{6}{5}$  units

**Answer: A**



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21. If  $\lim_{x \rightarrow \infty} \frac{ae^x + b \cos x + c + dx}{x \sin^2 x} = 3$ , then the value of  $272 \frac{abd}{c^3}$  is equal to



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22. A purse contains 10 ten rupee coins and 5 five rupee coins. Two coins are randomly drawn. If the expected value of 2 drawn coins is  $\lambda$ , then  $\frac{9\lambda}{4}$  is equal to

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23. If  $f(x) = \begin{cases} \frac{(2^x - 1)^2 \tan 3x}{x \sin^2 x} & 0 < x < \pi/6 \\ \lambda & x = 0 \end{cases}$  is

continuous at  $x = 0$ , then the value of  $\frac{10\sqrt{3\lambda}}{\ln 2}$  is equal

to

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24. If  $f: \mathbb{R} \rightarrow (0, \pi/2]$ ,  $f(x) = \sin^{-1}\left(\frac{40}{x^2 + x + \lambda}\right)$

is a surjective function, then the value of  $\lambda$  is equal to



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25. If  $f: \mathbb{R} \rightarrow \mathbb{R}$  is a function defined as

$$f(x^3) = x^5, \forall x \in \mathbb{R} - \{0\} \text{ and } f(x) \text{ is}$$

differentiable  $\forall x \in \mathbb{R}$ , then the value of  $\frac{1}{4}f'(27)$  is

equal to (here  $f'$  represents the derivative of  $f$ )



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