



## MATHS

### BOOKS - NTA MOCK TESTS

#### NTA JEE MOCK TEST 95

#### Mathematics

1. 5 boys & 4 girls sit in a straight line. Find the number of ways in which they can be seated if 2 girls are together & the other 2 are also together but separate from the first 2.:

A. 5400

B. 10800

C. 21600

D. 43200

**Answer: D**



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2. Let A and B are two non - singular matrices such that

$AB = BA^2, B^4 = I$  and  $A^k = I$ , then k can be equal to

A. 5

B. 10

C. 15

D. 16

**Answer: C**



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3. If  $g(x)$  is a differentiable function such that

$\int_1^{\sin \alpha} x^2 g(x) dx = (\sin \alpha - 1), \forall \alpha \in \left(0, \frac{\pi}{2}\right)$ , then the value of  $g\left(\frac{1}{3}\right)$  is equal to

A. 4

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

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

D. 9

**Answer: D**



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4. Let  $f(\theta) = \frac{1}{1 + (\tan \theta)^{2021}}$ , then the value of  $\sum_{\theta=1^{\circ}}^{89^{\circ}} f(\theta)$  is equal to

A. 45

B. 44

C.  $\frac{89}{2}$

D.  $\frac{91}{2}$

**Answer: C**



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5. If the circle  $x^2 + y^2 = 4x + 8y + 5$  intersects the line  $3x - 4y = m$  at two distinct points, then the number of possible integral values of  $m$  is equal to

A. 51

B. 50

C. 49

D. 48

**Answer: C**



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6. Let 2 planes are being contained by the vectors  $\alpha\hat{i} + 3\hat{j} - \hat{k}$ ,  $\hat{i} + (\alpha - 1)\hat{j} + 2\hat{k}$  and  $3\hat{i} + 5\hat{j} + 2\hat{k}$ . If the angle between these 2 planes is  $\theta$ , then the value of  $\cos^2 \theta$  is equal to

A.  $\frac{15}{17}$

B.  $\frac{289}{717}$

C.  $\frac{289}{2151}$

D.  $\frac{17}{2151}$

**Answer: C**

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7. If  $(1, 2, p)$ ,  $(2, 8, -6)$  and  $(\alpha^2 - 2\alpha, p, 1)$  are ordered triplet pair of the form  $(x, y, z)$  which satisfy all the equations

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1, \frac{x}{b} + \frac{y}{c} + \frac{z}{a} = 1 \text{ and } \frac{x}{c} + \frac{y}{a} + \frac{z}{b} = 1,$$

then the sum of all the values of  $\alpha$  is equal to (where,

$$ab + bc + ca \neq 0)$$

A. 3

B. 2

C. 0

D.  $-2$

**Answer: B**



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8. If  $\alpha, \beta$  and  $\gamma$  are the roots of the equation  $x^3 - px^2 + qx - r = 0$ , then the value of  $\frac{\alpha\beta}{\gamma} + \frac{\beta\gamma}{\alpha} + \frac{\gamma\alpha}{\beta}$  is equal to

A.  $pq + 3r$

B.  $pq + r$

C.  $pq - 3r$

D.  $\frac{q^2 - 2pr}{r}$

**Answer: D**



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9. Let  $p$ ,  $q$  and  $r$  be three statements. Consider two compound statements

$$S_1: (p \Rightarrow q) \Rightarrow r \equiv p \Rightarrow (p \Rightarrow r)$$

$$S_2: (p \Leftrightarrow q) \Leftrightarrow r \equiv p \Leftrightarrow (q \Leftrightarrow r)$$

State in order, whether  $S_1$ ,  $S_2$  are true or false.

(where, T represents true F represents false)

A. TT

B. TF

C. FT

D. FF

**Answer: A**



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10. Two poles standing on a horizontal ground are of height  $x$  meters and 40 meters respectively. The line joining their tops makes an angle of  $30^\circ$  with the ground and the distance between the foot of the poles is  $30\sqrt{3}$  meters, then the value of  $x$  can be

A. 20

B. 30

C. 10

D. 50

**Answer: C**



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11. If the function  $f: R \rightarrow A$  defined as  $f(x) = \sin^{-1}\left(\frac{x}{1+x^2}\right)$  is a surjective function, then the set

A is

A.  $\left[-\frac{\pi}{6}, \frac{\pi}{6}\right]$

B.  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

C.  $\left[-\frac{\pi}{3}, \frac{\pi}{6}\right]$

D.  $\left[0, \frac{\pi}{3}\right]$

**Answer: A**



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12. If function  $f(x) = \begin{cases} a\sqrt{x+7} & 0 \leq x < 2 \\ bx+1 & x \geq 2 \end{cases}$  is

differentiable  $a \geq 0$ , then the  $2a + 4b$  is equal to

A. 1

B. 5

C. 4

D. 9

**Answer: A**



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13. The integral  $I = \int \frac{2 \sin x}{(3 + \sin 2x)} dx$  simplifies to (where,  $C$  is

the constant of integration)

A.  $\ln \left| \frac{2 + \sin x - \cos x}{2 - \sin x + \cos x} \right| - \tan^{-1}(\sin x + \cos x) + C$

B.  $\ln(\sin x) + \sin 2x + C$

C.  $\sin(2x) - \ln(\cos x) + C$

D.

$$\frac{1}{4} \ln \left| \frac{2 + \sin x - \cos x}{2 - \sin x + \cos x} \right| - \frac{1}{\sqrt{2}} \tan^{-1} \left( \frac{\sin x + \cos x}{\sqrt{2}} \right) + C$$

**Answer: D**



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14. The least positive term of an arithmetic progression whose first two terms are  $\frac{5}{2}$  and  $\frac{23}{12}$  is

A. 6

B. 5

C.  $\frac{1}{6}$

D.  $\frac{37}{7}$

**Answer: C**



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15. Let  $f(x) = \min(x + 1, \sqrt{1 - x}) \forall x \leq 1$ . Then, the area (in sq. units) bounded by  $y = f(x)$ ,  $y = 0$  and  $x = 0$  from  $y = 0$  to  $x = 1$  is equal to

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

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

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

D. 1

**Answer: B**



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16. The solution of the differential equation  $ydx - xdy + \ln x dx = 0$  is (where, C is an arbitrary constant)

A.  $y = (\ln x)^2 + C$

B.  $y = (\ln x + 1) + C$

C.  $y = -(\ln x + 1) + C$

D.  $y = (\ln x)(x + C)$

**Answer: D**



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17. The perpendicular bisector of the line segment joining A(1, 4) and B(t, 3) has y - intercept equal to  $-4$ . Then, the product of all possible values of t is equal to

A. 1

B. 2

C.  $-16$

D.  $-4$

**Answer: C**



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**18.** Dice A has 4 red and 2 white faces whereas dice B has 3 red and 3 white faces. A coin is tossed once, if it falls head then the game continues by throwing the dice A and if it falls tail then the dice B is to be used. If red turns up at first 3 throws, then the probability that dice A is being used is

A.  $\frac{7}{37}$

B.  $\frac{64}{91}$

C.  $\frac{9}{41}$

D.  $\frac{27}{35}$

**Answer: B**



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**19.** If the normals at two points  $(x_1, y_1)$  and  $(x_2, y_2)$  of the parabola  $y^2 = 4x$  meet again on the parabola, where  $x_1 + x_2 = 8$  then  $|y_1 - y_2|$  is equal to

A.  $\sqrt{2}$

B. 3

C. 4



D. 2

**Answer: C**



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20. If the locus of the complex number  $z$  given by  $\arg(z + i) - \arg(z - i) = \frac{2\pi}{3}$  is an arc of a circle, then the length of the arc is

A.  $\frac{4\pi}{3}$

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

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

D.  $\frac{2\pi}{3\sqrt{3}}$

**Answer: B**

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21. The coefficient of the  $(2m + 1)^{\text{th}}$  and  $(4m + 5)^{\text{th}}$  terms in the expansion of  $(1 + x)^{100}$  are equal, then the value of  $\frac{m}{2}$  is equal to

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22. If the line  $\frac{x - 1}{2} = \frac{y - 2}{3} = \frac{z - 4}{4}$  intersect the  $xy$  and  $yz$  plane at points A and B respectively. If the volume of the tetrahedron OABC is  $V$  cubic units (where, O is the origin) and point C is  $(1, 0, 4)$ , then the value of  $102V$  is equal to

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23. The value of  $\lim_{x \rightarrow 0} \frac{\sin^2 3x}{\sqrt{3 + \sec x} - 2}$  is equal to

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24. If the acute formed between  $y$  - axis and the tangent drawn to the curve  $y = x^2 + 4x - 17$  at the point  $P\left(\frac{5}{2}, -\frac{3}{4}\right)$  is  $\theta$ , the value of  $\cot \theta$  is equal to

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25. Let  $C_1$  be the graph of  $xy = 1$  and the reflection of  $C_1$  in the line  $y = 2x$  is  $C_2$ . If the equation of  $C_2$  is expressed as  $12x^2 + bxy + cy^2 + d = 0$ , then the value of  $(b + c + d)$  is equal to

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