



# MATHS

## BOOKS - NTA MOCK TESTS

### JEE MOCK TEST 13

#### Mathematics

1. If the  $2^{nd}$ ,  $5^{th}$  and  $9^{th}$  terms of a non-constant arithmetic progression are in geometric progression, then the common ratio of this geometric progression is

A. 1

B.  $\frac{7}{4}$

C.  $\frac{8}{5}$

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

**Answer: D**



**Watch Video Solution**

2. All possible numbers are formed using the digits 1, 1, 2, 2, 2, 2, 3, 4, 4 taken all at a time. The number of such numbers in which the odd digits occupy even places is:

A. 175

B. 162

C. 180

D. 160

**Answer: C**



**Watch Video Solution**

3. Let  $w$  denote the words in the english dictionary.

Define the relation  $R$  by:  $R = \{(x, y) \in W \times W \mid$   
words  $x$  and  $y$  have at least one letter in common}.

Then  $R$  is: (1) reflexive, symmetric and not transitive (2)

reflexive, symmetric and transitive (3) reflexive, not symmetric and transitive (4) not reflexive, symmetric and transitive

- A. reflexive , symmetric and not transitive
- B. reflexive,symmetric and transitive
- C. reflexive , not symmetric and transitive
- D. not reflexive , symmetric and transitive

**Answer: A**



**Watch Video Solution**

4. The value of  $a$  for which

$$ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 1$$

has a real solution is

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

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

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

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

**Answer: C**



**Watch Video Solution**

5. The general solution of the differential equation

$$(2x - y + 1)dx + (2y - x + 1)dy = 0 \text{ is -}$$

A.  $x^2 + y^2 + xy - x + y = c$

B.  $x^2 + y^2 - xy + x + y = c$

C.  $x^2 - y^2 + 2xy - x + y = c$

D.  $x^2 - y^2 - 2xy + x - y = c$

**Answer: B**



**Watch Video Solution**

6. The mean of five numbers is 0 and their variance is 2. If three of those numbers are -1, 1 and 2, then the other two numbers are

A. -5 and 3

B. -4 and 2

C. -3 and 1

D. -2 and 0

**Answer: D**



**Watch Video Solution**

7. The first integral term in the expansion of

$$\left(\sqrt{3} + 2^{\frac{1}{3}}\right)^9, \text{ is}$$

A. 2<sup>nd</sup> term

B. 3<sup>rd</sup> term

C. 4<sup>th</sup> term

D. 5<sup>th</sup> term

**Answer: C**



**Watch Video Solution**



8.

If

$\cos \alpha + \cos \beta = a$ ,  $\sin \alpha + \sin \beta = b$  and  $\alpha - \beta = 2\theta$ ,

then  $\frac{\cos 3\theta}{\cos \theta} =$

A.  $a^2 + b^2 - 2$

B.  $a^2 + b^2 - 3$

C.  $3 - a^2 - 3$

D.  $\frac{a^2 + b^2}{4}$

**Answer: B**



**Watch Video Solution**

9. If the image of the point  $(1, -2, 3)$  in the plane  $2x + 3y - z = 7$  is the point  $(\alpha, \beta, \gamma)$ , then the value of  $\alpha + \beta + \gamma$  is equal to

A.  $-6$

B.  $10$

C.  $8$

D.  $-4$

**Answer: A**



**Watch Video Solution**

10. The value of  $\int \frac{dx}{x(x^n + 1)}$  is equal to

A.  $\frac{1}{n} \log_e \left( \frac{x^n}{x^n + 1} \right) + c$

B.  $\frac{1}{n} \log_e \left( \frac{x^n + 1}{x^n} \right) + c$

C.  $\log_e \left( \frac{x^n}{x^n + 1} \right) + c$

D. None of these

**Answer: A**



**Watch Video Solution**

11. If  $f$  is a function defined as

$$f(x) = x^2 - x + 5, f: \left( \frac{1}{2}, \infty \right) \rightarrow \left( \frac{19}{4}, \infty \right), \text{ and}$$

$g(x)$  is its inverse function, then  $g'(7)$  is equal to

A.  $-\frac{1}{13}$

B.  $\frac{1}{13}$

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

D.  $-\frac{1}{3}$

**Answer: C**



**Watch Video Solution**

**12.** Let  $\alpha$  and  $\beta$  be two roots of the equation

$x^2 + 2x + 2 = 0$ . Then  $\alpha^{15} + \beta^{15}$  is equal to

A.  $-512$

B.  $128$

C.  $512$

D.  $-256$

**Answer: D**



**Watch Video Solution**

**13.** The value of  $f(0)$ , such that

$f(x) = \frac{1}{x^2}(1 - \cos(\sin x))$  can be made continuous

at  $x=0$ , is

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

B. 2

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

D. 4

**Answer: A**



**Watch Video Solution**

**14.** The locus of the centre of the circle which cuts the circle  $x^2 + y^2 - 20x + 4 = 0$  orthogonally and touches the line  $x = 2$  is

A.  $y^2 = 16x + 4$

B.  $x^2 = 16y$

C.  $x^2 = 16y + 4$

D.  $y^2 = 16x$

**Answer: D**



**Watch Video Solution**

15. The parabolas  $y^2 = 4x$  and  $x^2 = 4y$  divide the square region bounded by the lines  $x=4$ ,  $y=4$  and the coordinate axes. If  $S_1$ ,  $S_2$ ,  $S_3$  are the areas of these parts numbered from top to bottom, respectively, then

A. 2 : 1 : 2

B. 1 : 1 : 1

C. 1 : 2 : 1

D. 1 : 2 : 3

**Answer: B**



**Watch Video Solution**

**16.** The value of

$$\lim_{x \rightarrow \infty} \frac{2x^{1/2} + 3x^{1/3} + 4x^{1/4} + \dots + nx^{1/n}}{(2x - 3)^{1/2} + (2x - 3)^{1/3} + \dots + (2x - 3)^{1/n}}$$

is

A.  $\sqrt{2}$



B. 2

C.  $\frac{1}{\sqrt{3}}$

D. 0

**Answer: A**



**Watch Video Solution**

17. If  $f(x) = x^3 + 4x^2 + ax + 5$  is a monotonically decreasing function of  $x$  in the largest possible interval  $(-2, -2/3)$ , then the value of  $a$  is

A.  $\lambda = 4$

B.  $\lambda = 2$

C.  $\lambda = -1$

D.  $\lambda$  has no real value

**Answer: A**



**Watch Video Solution**

**18.** If the angles of elevation of the top of tower from three collinear points  $A$ ,  $B$  and  $C$ , on a line leading to the foot of the tower, are  $30^\circ$ ,  $45^\circ$  and  $60^\circ$  respectively, then the ratio,  $AB:BC$  is

A.  $2:3$

B.  $\sqrt{3}:1$

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

D.  $1 : \sqrt{3}$

**Answer: B**



**Watch Video Solution**

**19.** A unit vector in the  $xy$ -plane that makes an angle of  $\frac{\pi}{4}$  with the vector  $\hat{i} + \hat{j}$  and an angle of with the vector  $3\hat{i} - 4\hat{j}$  is

A.  $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$

B.  $\frac{\hat{i} - \hat{j}}{\sqrt{2}}$

C.  $\frac{2\hat{i} - \hat{j}}{\sqrt{2}}$

D. None of these

Answer: D



Watch Video Solution

20. If  $x = \frac{1 - t^2}{1 + t^2}$  and  $y = \frac{2t}{1 + t^2}$ , then  $\frac{dy}{dx}$  is equal to

A.  $-\frac{y}{x}$

B.  $\frac{y}{x}$

C.  $-\frac{x}{y}$

D.  $\frac{x}{y}$

Answer: C



Watch Video Solution

21. Let  $A$  be a matrix of order  $3 \times 3$  such that  $\det(A) = 2$ ,  $B = 2A^{-1}$  and  $C = \frac{(\text{adj}A)}{\sqrt[3]{16}}$ , then the value of  $\det(A^3 B^2 C^3)$  is



Watch Video Solution

22. Given  $f(x)$  where

$$= \begin{cases} x|x| & \text{for } x \leq -1 \\ [x+1] + [1-x] & \text{for } -1 < x < 1, \text{ [.] denotes} \\ -x|x| & \text{for } x \geq 1 \end{cases}$$

the greatest integer function. If  $I = \int_{-2}^2 f(x) dx$ , then

$|3I| =$



[Watch Video Solution](#)

**23.** The line  $3x + 2y = 24$  meets the y-axis at  $A$  and the x-axis at  $B$ . The perpendicular bisector of  $AB$  meets the line through  $(0, -1)$  parallel to the x-axis at  $C$ . If the area of triangle  $ABC$  is  $A$ , then the value of  $\frac{A}{13}$  is \_\_\_\_\_



[Watch Video Solution](#)

24. The minimum number of times a fair coin needs to be tossed, so that the probability of getting at least two heads is at least 0.96, is \_\_\_\_\_.



[Watch Video Solution](#)

25. Consider the equation  $x^2 + 2x - n = 0$  where  $n \in \mathbb{N}$  and  $n \in [5, 100]$ . The total number of different values of  $n$  so that the given equation has integral roots is



[Watch Video Solution](#)