



# MATHS

# **BOOKS - NTA MOCK TESTS**

# NTA JEE MOCK TEST 49

Mathematics

1. If 
$$C_0, C_1, C_2, \ldots, C_{20}$$
 are the binomial coefficients in the expansion of  $(1+x)^{20}$ , then the value of  $\frac{C_1}{C_0} + 2\frac{C_2}{C_1} + 3\frac{C_3}{C_2} + \ldots + 19\frac{C_{19}}{C_{18}} + 20\frac{C_{20}}{C_{19}}$  is

equal to (where  $C_r$  represetns .<sup>n</sup>  $C_r$ )

A. 120

B. 210

C. 180

D. 240

## Answer: B



2. If one root is greater than 2 and the other root is less than 2 for the equation  $x^2 - (k+1)x + (k^2 + k - 8) = 0$ , then the value of

k lies between

A. 
$$(-2, 2)$$
  
B.  $(-2, 4)$   
C.  $(-2, 0)$   
D.  $(-2, 3)$ 

## Answer: D



3. If  $a_1 + a_5 + a_{10} + a_{15} + a_{24} = 225$ , then the sum of the first 24 terms of the arithmetic progression  $a_1, a_2, a_3, \ldots$  is equal to

B. 675

C. 900

D. 1200

Answer: C

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**4.** The value of  $2\alpha + \beta \left(0 < \alpha, \beta < \frac{\pi}{2}\right)$ , satisfying the equation  $\cos \alpha \cos \beta \cos(\alpha + \beta) = -\frac{1}{8}$  is equal to

A. 
$$\frac{5}{6}\pi$$
  
B.  $\frac{\pi}{2}$ 

**C**. *π* 

D.  $\frac{7\pi}{12}$ 

## Answer: C

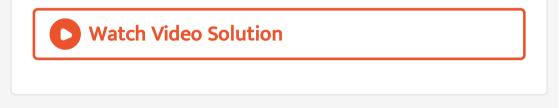


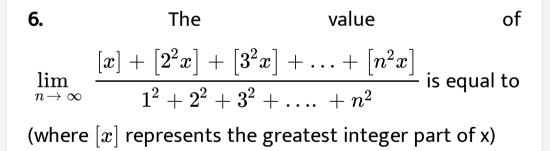
5. A pole is situated at the centre of a regular hexagonal park. The angle of elevation of the top of the vertical pole when observed from each vertex of the hexagon is  $\frac{\pi}{3}$ . If the area of the circle circumscribing the hexagon is  $27m^2$ , then the height of the tower is

A. 
$$3\sqrt{\frac{3}{\pi}}m$$

B. 
$$\frac{3}{\sqrt{\pi}}m$$
  
C.  $\sqrt{\frac{3}{\pi}}m$   
D.  $\frac{9}{\sqrt{\pi}}m$ 

## Answer: D





## A. x

B. 2x

C. 
$$\frac{x}{2}$$
  
D.  $\frac{x}{6}$ 

## Answer: A



7. Let 
$$I = \int rac{\cos^3 x}{1+\sin^2 x} dx$$
, then I is equal to (where c

is the constant of integration )

A. 
$$2 an^{-1}(x) + \sin x + c$$

B. 
$$2 \tan^{-1}(\sin x) - \sin x + c$$

$$\mathsf{C.}\, 2 \tan^{-1}(x) - x + c$$

$$\mathsf{D.}\, 2\tan^{-1}(\sin x) + \sin x + c$$

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**8.** The slope of the tangent (other than the x - axis) drawn from the origin to the curve  $y = \left(x-1
ight)^6$  is

A. 
$$\frac{6^5}{5^4}$$
  
B.  $-\frac{6^5}{5^5}$   
C.  $\frac{6^5}{5^5}$   
D.  $-\frac{6^6}{5^5}$ 

## Answer: D

9. The maximum value of the expression $\sin heta\cos^2 heta(orall heta\in[0,\pi])$  is

A. 
$$\frac{2}{3}$$
  
B.  $\frac{2}{\sqrt{3}}$   
C.  $\frac{2}{3\sqrt{3}}$   
D.  $\frac{1}{\sqrt{3}}$ 

## Answer: C

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10. The area (in sq. units) bounded by  $y = \begin{cases} e^x & : \ x \ge 0 \\ e^{-x} & : \ x \le 0 \end{cases}$  with the axis from x = -1 to x = 1 is

A. e

B. 2e

- $\mathsf{C.}\,2e-2$
- $\mathsf{D.}\,2e+2$

## Answer: C



**11.** The slope of the tangent at any arbitrary point of a curve is twice the product of the abscissa and square of the ordinate of the point. Then, the equation of the curve is (where c is an arbitrary constant)

A. 
$$x^2y+y+c=0$$

B. 
$$x^2y + cy + 1 = 0$$

C. 
$$xy + y + c = 0$$

D. 
$$xy^2 + cy + y = 0$$

## Answer: B

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12. If the system of equations  

$$3x + y + z = 1, 6x + 3y + 2z = 1$$
 and  
 $\mu x + \lambda y + 3z = 1$  is inconsistent, then  
A.  $\mu \neq 9, \lambda \neq 5$   
B.  $\mu \neq 9, \lambda \neq 5$   
C.  $\mu = 9, \lambda = 5$   
D.  $\mu = 9, \lambda \neq 5$ 

## Answer: D



**13.** The probability of an event A is  $\frac{4}{5}$ . The probability of an event B, given that the event A occurs is  $\frac{1}{5}$ . The probability of event A, given that the event B occurs is  $\frac{2}{3}$ . The probability that neigher of the events occurs is

A. 
$$\frac{3}{25}$$
  
B.  $\frac{2}{5}$   
C.  $\frac{1}{25}$   
D.  $\frac{2}{15}$ 

## Answer: A

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14. Let  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  be three vectors such that  $\left|\overrightarrow{a}\right| = 2$ ,  $\left|\overrightarrow{b}\right| = 1$  and  $\left|\overrightarrow{c}\right| = 3$ . If the projection of  $\overrightarrow{b}$  along  $\overrightarrow{a}$  is double of the projection of  $\overrightarrow{c}$  along  $\overrightarrow{a}$  and  $\overrightarrow{b}$ ,  $\overrightarrow{c}$  are perpendicular to each other, then  $\left|\overrightarrow{a} - \overrightarrow{b} + 2\overrightarrow{c}\right|^2$  is equal to

A. 41

B. 14

C.  $\sqrt{14}$ 

D. 20.5

Answer: D



15. The distance of the point (2, 3, 2) from the plane 3x + 4y + 4z = 23 measured parallel to the line  $\frac{x+3}{1} = \frac{y-6}{-2} = \frac{z-1}{1}$  is

A.  $\sqrt{108}$  units

B. 12 units

C.  $\sqrt{54}$  units

D.  $\sqrt{236}$  units

Answer: C



16. Let the equations of the sides PQ, QR, RS and SP of

а	quadrilateral	PQRS	are
x+2y	-3=0, x-1=0, x	x - 3y - 4 = 0	and
5x + y	$+\ 12 = 0$ respectively.	If $ heta$ is the angle b	etween
the dia	gonals PR and QS, the	n the value of $ { m t}$	$\operatorname{an} heta $ is
equal t	0		

A. 2

 $\mathsf{B.}-2$ 

C. 1

D. Not defined

## Answer: D

17. The locus of the point of intersection of the tangents at the extremities of a chord of the circle  $x^2 + y^2 = r^2$  which touches the circle  $x^{2} + y^{2} + 2rx = 0$  is A.  $y^2=2r\Big(x-rac{r}{2}\Big)$  $\mathsf{B}.\,y^2=\,-\,2r\Big(x+\frac{r}{2}\Big)$  $\mathsf{C}.\,y^2 = 2r\Big(x+\frac{r}{2}\Big)$  $\mathsf{D}.\,y^2=\,-\,2r\Big(x-\frac{r}{2}\Big)$ 

#### Answer: C

**18.** Two straight lines having variable slopes  $m_1$  and  $m_2$  pass through the fixed points (a, 0) and (-a, 0) respectively. If  $m_1m_2 = 2$ , then the eccentricity of the locus of the point of intersection of the lines is

A.  $\sqrt{2}$ 

B.  $\sqrt{3}$ 

C. 2

D. 
$$\sqrt{rac{3}{2}}$$

## Answer: B

**19.** For a complex number Z, if arg  $Z = \frac{\pi}{4}$  and  $\left|Z + \frac{1}{Z}\right| = 4$ , then the value of  $\left||Z| - \frac{1}{|Z|}\right|$  is equal to



B.  $\sqrt{18}$ 

C. 4

D.  $\sqrt{12}$ 

## **Answer: A**



**20.** In a factory, workers work in three shifts, say shift 1, shift 2 and shift 3 and they get wages in the ratio 3:4:8 depending on the shift 1, 2 and 3 respectively. Number of workers in the shifts are in the ratio 3:2:5. If the total number of workers working is 1500 and wages per worker in shift 1 is Rs. 300, then the mean wage of a worker is

A. Rs. 460

B. Rs. 520

C. Rs. 570

D. Rs. 420

#### Answer: C

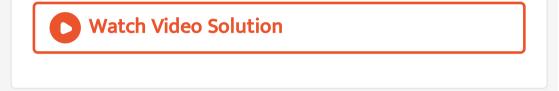
**21.** The value of a + b such that the inequality  $a \leq 5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3 \leq b$  holds true for all the real values of  $\theta$  is (equality holds on both sides atleast once for real values of  $\theta$ )

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22. If the line  $y = -\frac{7}{2}$  is the directrix of the parabola  $x^2 - ky + 8 = 0$ , then the sum of all the possible

values of k is equal to

23. Let A be a non - singular square matrix such that  $A^2 = A$  satisfying  $(I - 0.8A)^{-1} = I - \alpha A$  where I is a unit matrix of the same order as that of A, then the value of  $-4\alpha$  is equal to



$$f(x) = egin{cases} \left(rac{1-\cos x}{\left(2\pi-x
ight)^2}
ight) \left(rac{\sin^2 x}{\log\left(1+4\pi^2-4\pi x+x^2
ight)}
ight) &: x
eq 2\pi \ \lambda &: x=2\pi \end{cases}$$

is continuous at  $x=2\pi$ , then the value of  $\lambda$  is equal

to

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25. If 
$$\int_{20}^{40} rac{\sin x}{\sin x + \sin(60 + x)} dx = k$$
, then the value of  $rac{k}{4}$  is equal to

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