



MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 108



- 1. For $f(x)=x^3+bx^2+cx+d$, if $b^2>4c>0$ and
- $b,c,d\in R$, then f(x)

A. is strictly increasing

- B. is strictly decreasing
- C. has a local maxima

D. is bounded

Answer: C

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2. Let f(x) be a differentiable function such that
$$\int_t^{t^2} x f(x) dx = rac{4}{3} t^3 - rac{4t}{3} \, orall t \ge 0$$
, then f(1) is equal to A. 4

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

C. 3

D.
$$\frac{8}{3}$$

Answer: D

3. If the area bounded by $y^2 = 4ax$ and $x^2 = 4ay$ is $\frac{64}{3}$ square units, then the positive value of a is

A. 1 B. 2 C. 3

D. 4

Answer: B



4. If
$$\left(\frac{2+\cos x}{3+y}\right)\frac{dy}{dx} + \sin x = 0$$
 and $y(0) = 1$, then
 $y\left(\frac{\pi}{3}\right)$ is equal to
A. $\frac{4}{3}$
B. $\frac{7}{3}$
C. $\frac{1}{3}$

D. 1

Answer: C



5. The area (in square units) of the triangle bounded by x = 4 and the lines $y^2 - x^2 + 2x = 1$ is equal to

A. 3

B. 6

C. 12

D. 9

Answer: D

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6. The angle between the tangents drawn from the point (2,

6) to the parabola $y^2-4y-4x+8=0$ is

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

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

Answer: C

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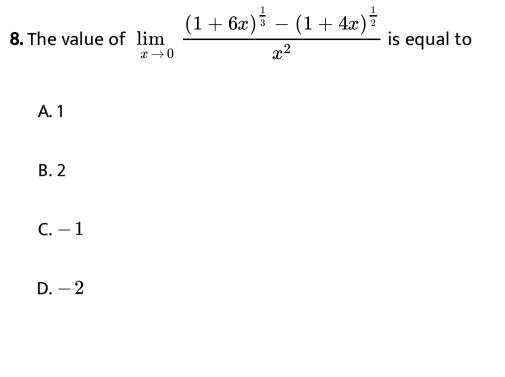
7. If
$$f(x) = \cos x + \sin x$$
 and $g(x) = x^2 - 1$, then $g(f(x))$

is injective in the interval

A.
$$\left[0, \frac{\pi}{2}\right]$$

B. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$
C. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
D. $\left[0, \pi\right]$

Answer: B



Answer: D



9. If
$$\int rac{x}{x+1+e^x} dx = px + q \ln |x+1+e^x| + c$$
, where c is

the constant of integration, then p+q is equal to

A. 0

B. 1

C. 2

D. 3

Answer: A

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10. Let X_n denote the mean of first n natural numbers, then

the mean of $X_1, X_2, \ldots, \ldots, X_{100}$ is

A. 25

B. 50

C. 25.5

Answer: D

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11. Let
$$f(x)=rac{\sin x+3\sin 3x+5\sin 5x+3\sin 7x}{\sin 2x+2\sin 4x+3\sin 6x}$$
, wherever defined. If $x_1+x_2=rac{\pi}{2}$, where $f(x)$ is defined at x_1 and x_2 , then $f^2(x_1)+f^2(x_2)$ is

A. $\cos^2 x$

 $\mathsf{B.}\sin^2 x$

C. 4

D. 1

Answer: C



12. If two points A and B lie on the curve $y = x^2$ such that \overrightarrow{OA} . $\hat{i} = 1$ and \overrightarrow{OB} . $\hat{j} = 4$, where O is origin and A and B lie in the 1st and 2nd quadrant respectively, then \overrightarrow{OA} . \overrightarrow{OB} is equal to

- A. 0
- B. 2
- C. 4
- D. 5

Answer: B

13. A man alternately tosses a coin and throw a dice, beginning with the coin. The probability that he gets a head in coin before he gets a 5 or 6 in dice, is

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

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

Answer: A



14. A plane P passes through the point (1, 1, 1) and is parallel to the vectors $\overrightarrow{a} = -\hat{i} + \hat{j}$ and $\overrightarrow{b} = \hat{i} - \hat{k}$. The distance of the point

$$\left(rac{3\sqrt{3}}{2}, 3\sqrt{3}, 3
ight)$$
 from the plane is

equal to

A.
$$\sqrt{3}$$
 units

$$\mathsf{B}.\,\frac{9}{2}\quad\text{units}$$

C. $3\sqrt{3}$ units

D. 3 units

Answer: B



15. Let A and B two non singular matrices of same order such that $(AB)^k = B^k A^k$ for consecutive positive integral values of k, then $AB^2 A^{-1}$ is equal to A. A^2

B. B

C. A

 $\mathsf{D.}\,B^2$

Answer: D

16. The value of
$$\Sigma_{r=1}^n {(-1)}^{r+1} rac{{}^n C_r}{r+1}$$
 is equal to

$$A. - \frac{1}{n+1}$$
$$B. - \frac{1}{n}$$
$$C. \frac{1}{n+1}$$
$$D. \frac{n}{n+1}$$

Answer: D



17. If α and β are the roots of the equation $x^2 + \alpha x + \beta = 0$ such that $\alpha \neq \beta$, then the number of integral values of x satisfying $||x - \beta| - \alpha| < 1$ is

A. 0

B. 1

C. 2

D. more than 2

Answer: C

18. Given α and β are the roots of the quadratic equation $x^2 - 4x + k = 0 (k \neq 0)$. If $\alpha\beta$, $\alpha\beta^2 + \alpha^2\beta$ and $\alpha^3 + \beta^3$ are in geometric progression, then the value of k is equal to

A. 4

B.
$$\frac{16}{7}$$

C. $\frac{3}{7}$

D. 12

Answer: B



19. The equation $\cos^4 x - \sin^4 x + \cos 2x + lpha^2 + lpha = 0$ will have at least one solution, if

A.
$$-2 \leq lpha \leq 2$$

 $\mathsf{B.}-3 \leq \alpha \leq 1$

$$\mathsf{C}.-2\leqlpha\leq1$$

$$\mathsf{D.}-1 \leq lpha \leq 2$$

Answer: C

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20. The radius of the circle with centre at (3, 2) and whose

common chord with the cirlce

C : $x^2 + y^2 - 4x - 8y + 16 = 0$ is also a diameter of the circle C, is

A. 3 units

B. 2 units

C.1 units

D. $\sqrt{3}$ units

Answer: A

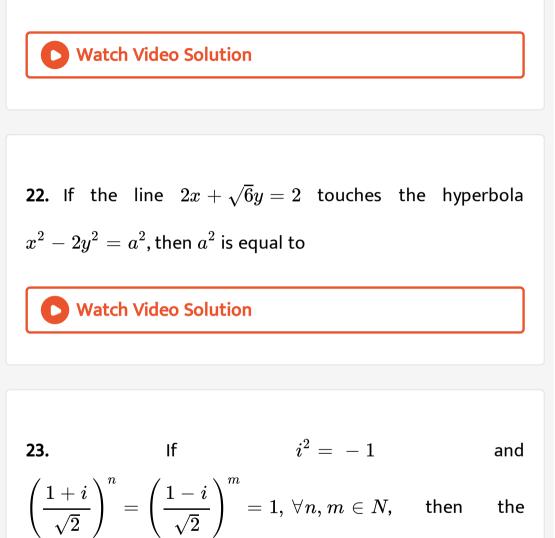


21.

Let

 $f(x) = [x] \{x^2\} + [x] [x^2] + \{x\} [x^2] + \{x\} \{x^2\}, \, \forall x \in [0, 10]$ [.] and {.} the greatest integer and fractional part functions respectively). The number of points of discontinuity

of f(x) is



minimum value of n + m is equal to

24. If a, b and c are non - zero real numbers and if system of equations

 $(a-1)x = y+z, (b-1)y = z+x ext{ and } (c-1)z = x+y$ have a non - trivial solutin, then $rac{3}{2a} + rac{3}{2b} + rac{3}{2c}$ is equal to

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25. The number of quadratic polynomials $ax^2 + 2bx + c$ which satisfy the following conditions is k

(i) a, b, c are distinct

(ii) $a, b, c \in \{1, 2, 3, 4, \ldots 2001, 2002\}$

(iii) x+1 divides ax+2bx+c Then $\displaystyle rac{k}{10^5}$ is equal to