MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 112

Mathematics

1. Calculate the $\frac{dy}{dx}$ of the given function

$y = \tan^{-1}(\cot x) + \cot^{-1}(\tan x)$, in the interval $x \in \left(\frac{\pi}{2}\pi\right)$

A. 0

B. -1

C. 2

D. -2

Answer: D

View Text Solution

2. The tangent at (1,7) to the curve $x^2 = y - 6$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ at

A. (6,7)

B. (-6,7)

C. (6,-7)

D. (-6,-7)

Answer: D

View Text Solution

3. The negation of the statement If Amit is eating then Bipin is sleeing is:

A. Amit is eating or Bipin is not sleeping

B. If Amit is not sleeping then Bipin is not sleeping

C. Amit is eating and Bipin is not sleeping

D. Amit is not eating or Bipin is sleeping

Answer: C

View Text Solution

4. If $|(apha, x, x, x), (x, \beta x, x), (x, x, \gamma, x), (x, x, x, \delta)| = f(x) - xf'(x)$ then f(x) is

A. $(x-\alpha)(x-\beta)(x-\gamma)(x-\delta)$

B. $(x+\alpha)(x+\beta)(x+\gamma)(x+\delta)$

C. $2(x-\alpha)(x-\beta)(x-\gamma)(x-\delta)$

D. None of these

Answer: A

View Text Solution

5. Let $F: R \to R$ be function defined by $f(x) = \begin{cases} x + \frac{1}{x} & x > 0 \\ e^x & x \leq 0 \end{cases}$

then f is

A. both one one onto

B. one one but not onto

C. onto but not one one

D. neither one one or onto

Answer: D

View Text Solution

6. Let $a = \{0, 1, 5, 4, 7\}$. Then the total number of subsets of S is

A. 64

B. 32

C. 40

D. 20

Answer: B

View Text Solution

7. $x = \frac{e^t + e^{-t}}{2}, y = \frac{e^t - e^{-t}}{2}, t \in R$ represents

A. An ellipse

B. A prabola

C. A hyperbola

D. A circle

Answer: C

View Text Solution

8. A box contains 6 red, 5 blue and 4 white marbles. For marbles are chosen at random without repalcemet. The probabiltiy that there is atleast one marble of each colour among the four chosen is

A. $\frac{48}{91}$

B. $\frac{44}{91}$

C. $\frac{88}{91}$

D. $\frac{24}{91}$

Answer: A

View Text Solution

9. The line of intersection of the planes $\vec{r}.\left(3\hat{i}-\hat{j}+\hat{k}\right)=1$ and $\vec{r}.\left(\hat{i}+4\hat{j}-2\hat{k}\right)=2$ is parallel is

A. $2\hat{i}+7\hat{j}+13\hat{k}$

B. $-2\hat{i}-7\hat{j}+13\hat{k}$

C. $2\hat{i}+7\hat{j}-13\hat{k}$

D. $-2\hat{i}+7\hat{j}+13\hat{k}$

Answer: D

View Text Solution

10. The velocity of a boat relative to water is $3\hat{i}+4\hat{j}$ and that of water relative to the earth is $\hat{i}-3\hat{j}$. Then the magnitude velocity of

the boat relative to the earth, if $\hat{i}$ and $\hat{j}$ represent velocities of 1 km/h East and North respectively is

A. $\sqrt{17}$ km/h

B. $\sqrt{15}$km/h

C. $\sqrt{13}$km/h

D. $\sqrt{19}$km/h

Answer: A

View Text Solution

11. $\lim_{x \to 0} \frac{8}{x^8}$ is $\left[1 - \cos\frac{x^2}{2} - \cos\frac{x^2}{4} + \frac{\cos^{x^2}}{2}\cos\frac{x^2}{4}\right]$ equal to

A. $\frac{1}{16}$

B. $-\frac{1}{16}$

C. $\frac{1}{32}$

D. $-\frac{1}{32}$

Answer: C

View Text Solution

12. Let $f(x) = \cos x, g(x)$

$\{(\text{minimum}\{(t) : 0 \leq t \leq x\}, x \in [0, \pi]), (\sin x - 1, x > \pi)\}$ then

A. g(x) is discontinuous at $x = \pi$

B. g(x) is continuous for $x \in [0, \infty)$

C. g(x) is differentiable at $x = \pi$

D. g(x) is differentiable for $x \in [0, \infty)$

Answer: B

View Text Solution

13. If g(x) be differentiable function for all real values of x and satisfied

$\int_0^x g(t)xt = \frac{x^2}{2} + \int_x^0 t^2(t)dt$ then $\int_{-1/2}^{1} g(x)$ is equal to

A. $In\left(\frac{5}{8}\right)$

B. $2\ln\left(\frac{8}{5}\right)$

C. $\frac{1}{2}\ln\left(\frac{8}{5}\right)$

D. $\frac{1}{2}In\left(\frac{5}{8}\right)$

Answer: C

View Text Solution

14. Let A (2,3),B(4,5) be two points and let $C = (x, y)$ be a point such that $(x-2)(x-4) + (y-3)(y-5) = 0$ If area of $\Delta ABC = \sqrt{2}$

aq. Units, then find the maximum number of positions of C in the xy plane.

A. 1

B. 2

C. 3

D. 4

Answer: D

View Text Solution

15. $\cos(2001)\pi + \cot(2001)\frac{\pi}{2}$ is $+\sec(2001)\frac{\pi}{3} + \tan(2001)\frac{\pi}{4} + \cos ec(2001)\frac{\pi}{6}$ equal to

A. 0

B. 1

C. -2

D. not defined

Answer: C

View Text Solution

16. If $a\cos 2\theta + b\sin 2\theta = c$ has α and β as its solution, then $\tan\alpha + \tan\beta$ is equal to

A. $\frac{2c}{a+b}$

B. $\frac{2c}{b+c}$

C. $\frac{2b}{c+a}$

D. None of these

Answer: C

View Text Solution

17. If $\cos^{-1} x_1 - \cos^{-x} x_2$ if $+\cos^{-1}\left(x_1 x_2 \sqrt{1-x_1^2}\sqrt{1-x_2}\right)$ if =0,

A. $x_1 + x_2 \leq 1$

B. $x_1 + x_2 \geq -1$

C. $x_1 \leq x_2$

D. $0 \leq x_2 \leq x_1 \leq 1$

Answer: D

View Text Solution

18. If the pair of lines $ax^2 + 2(a+b)xy + by^2 = 0$ lie along diameters of a circle and divide the circle into four section such that the area of one of the sector is thrice theara of another sector then

A. $3a^2 - 10ab + 3b^2 = 0$

B. $3a^2 - 2ab + 3b^2 = 0$

C. $3a^2 + 10ab + 3b^2 = 0$

D. $3a^2 + 2ab + 3b^2 = 0$

Answer: D

View Text Solution

19. If $a, b, c \in R$ and 1 is a root of equation $ax^2 + bx + c = 0$ then the curve

$y = 4ax^2 + 3bx + 2c, a \neq 0$ intersect x axis at

A. two distinct points whose coordinates are always rational numbers

B. no point

C. exactly two distinct points

D. exactly one point

Answer: D

View Text Solution

20. The greatest positive integer which divides

$(n+2)(n+3)(n+4)(n+5)(n+6)$ for all $n \in N$ is .

A. 120

B. 3720

C. 286

D. 720

Answer: A

View Text Solution

21. Find the greatest value of n among all possible natural numbers n, such that the coefficient of x in the expansion of $\left(x^3+\frac{1}{x^4}\right)^n$, is ${}^nC_{11}$

View Text Solution

22. If $C(n,12)=C(n,8)$ then evaluate $P(22,22-n)-C(22,n)$ where $C(n,r)={}^nC_r$ and $P(n,r)={}^nP_r$

View Text Solution

23. If α,β,γ are three real number such that $\alpha+\beta+\gamma=0$, Δ then find

$$=\begin{vmatrix}1 & \cos\gamma & \cos\beta\\ \cos\gamma & 1 & \cos\alpha\\ \cos\beta & \cos\alpha & 1\end{vmatrix}$$ the value of Δ

View Text Solution

24. Let p and q be the roots of $x^2 - 3x + m = 0$ and r and s be the roots of $x^2 - 23x + n = 0$ If $p < q < r < s$ are in A.P then find the value of $m + n$.

View Text Solution

25. The curve $y = 4x^2 + 2x - 8$ and $y = x^3 - x + 10$ touch each other at (p,q). Evaluate $q - p^3$

View Text Solution

26. If $z = x + iy$ and $x^2 + y^2 = 36$ and the range of $|x| - |y|$ is $[a, b]$ then evaluate $b^2 - a^2$

View Text Solution

27. If $I = \int \frac{x-1}{(x+1)\sqrt{x^3+x^2+x}} dx = g(x) + c$, then $\left[\frac{1}{g'(2)}\right] =$ ...,(where [.] represents the greatest integer function).

View Text Solution

28. Let A_1, A_2 denote the area bounded by the curve $y = x|x|$, axis the lines $x = -1, x = 1$ and the area enlosed between the curves $y^2 = x, y = |x|$. Find $\frac{A_1}{A_2}$

View Text Solution

29. In a moderately skewed distribution the values fo mean, and mode are 11k and 5k respectively. Find the value of its median when k=1.2

View Text Solution

30. $y = y(x)$ satisfies the differential equation $(x + y + 1)dy = dx$ .If $y(0) = 0$ and $(x + y) = m(e^y - 1)$, find m

View Text Solution