

JEE MAIN QUESTION PAPER 27 JANUARY 2024

MATHEMATICS:

1. $x^2/25 + y^2/16 = 1$ is the given ellipse. Find the length of the chord whose midpoint is (1/2, 2/5).

Answer. (7v41)/5

2. Find p if: 3 + (3 + p)/4 + (3 + 2p)/4² + ... ∞ = 8

Answer. P=9

3. If a line L = 4x + 5y = 20 trisects two other lines L₁ and L₂ that pass through the origin, then find the tangent made by the line L.

Answer. 8/5 & 2/5

4.
$$a = \lim_{x \to \infty} \left(\frac{\sqrt{1 + \sqrt{1 + x^2} - \sqrt{2}}}{x^4} \right)$$
 and $b = \lim_{x \to \infty} \left(\frac{\sin^2 x}{\sqrt{2} - \sqrt{1 + \cos x}} \right)$, then find ab^3 .

Answer: $ab^3 = 32$

5. The vertices of a triangle ABC are A(1,2), B(-3, 4) and C(5,8), then the orthocentre of \triangle ABC is?

Answer. (3/2):1

6. $S_1 = 3,9,15, \dots 25$ terms and $S_2 = 3,8,13, \dots 37$ terms, then the number of common terms in S_1 , S_2 is equal to?

Answer. 5

7. The value of k for (2k, 3k), (0, 0), (1,0) and (0,1) to be on the circle is:

Answer. 5/13
8.
$$\int_{0}^{1} \frac{1}{\sqrt{3+x}+\sqrt{1+x}} dx = a + b\sqrt{2} + c\sqrt{3}$$
, then $2a - 3b - 4c = ?$ A chieve

Answer: 12

If
$$f(x) - f(y) = \ln\left(\frac{x}{y}\right) + x - y$$
, then find $\sum_{k=1}^{20} f'\left(\frac{1}{k^2}\right)$

Answer: 2890

9. If ${}^{n-1}C_r = (k^2 - 8)^n C_{r+1}$, then find k.

Answer. k \in [-3, 2 $\sqrt{2}$) U (2 $\sqrt{2}$, 3]

10. Find the charge on the capacitor in the given circuit at a steady state.

Answer. Liquid

$$11. f(x) = \begin{cases} 2^{\frac{\sin(x-3)}{x-[x]}} , & x < 3\\ \frac{a|-x^2-12+7|}{b(x^2+12x+7)} , & x > 3\\ b , & x = 3 \end{cases}$$

If f(x) is continuous at x = 3, then (a, b) = ?



Answer: None of these

If
$$f(x) = \begin{bmatrix} \cos x & -\sin x & 0\\ \sin x & \cos x & 0\\ 0 & 0 & 1 \end{bmatrix}$$

Statement I \Rightarrow $f(x) \cdot f(y) = f(x + y)$

Statement II $\Rightarrow f(-x) = 0$ is invertible

Answer: Both Statement I and Statement II are True.

12. Shortest distance between the parabola $y^2 = 4x$ and $x^2 + y^2 - 4x - 16y + 64 = 0$ is equal to?

Answer. 2v5-2

13. If $f(x) = x^3 + 2x^{2*}f'(1) + x^*f''(2) + f'''(3)$. The value of f'(10) is equal to?

X

Answer: 218

14. A = {1,2,3,...,10}, S be the set of subsets of A and R = {(a,b): a, b \in S and a \cap b $\neq \emptyset$ }. Then R is

Answer. Symmetric Only

15. The shortest distance between the lines is? (x - 1)/2 = (y + 1)/4 = (z - 1)/3 and (2x - 1)/5 = (y - 2)/3 = z/3

Answer. 34/v1045 unit

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