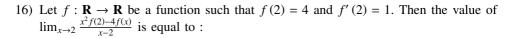
JEE Mains PYQ 27/07/2021 Shift-1

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a) 4

b) 8

c) 16

- d) 12
- 17) Let P and Q be two distinct points on a circle which has centre at C(2,3) and which passes through origin O. If OC is perpendicular to both the line segment CP and CQ then the set $\{P, Q\}$ is equal to
 - a) $\{(4,0),(0,6)\}$

 - b) $\{(2+2\sqrt{2},3-\sqrt{5}),(2-2\sqrt{2},3+\sqrt{5})\}$ c) $\{(2+2\sqrt{2},3+\sqrt{5}),(2-2\sqrt{2},3-\sqrt{5})\}$
 - d) $\{(-1,5),(5,1)\}$
- 18) let α , β be two roots of the equation $x^2 + (20)^{\frac{1}{4}}x + (5)^{\frac{1}{2}} = 0$. Then $\alpha^8 + \beta^8$ is equal
 - a) 10

- b) 100
- c) 50

- d) 160
- 19) The probability that a randomly selected 2 digit number belongs to the set $\{n \in \mathbb{N} : (2^n - 2) \text{ is a multiple of 3} \}$ is equal to
 - a) $\frac{1}{6}$

b) $\frac{2}{3}$

c) $\frac{1}{2}$

d) $\frac{1}{3}$

20) Let

$$A = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid 2x^2 + 2y^2 - 2x - 2y = 1\},$$

$$B = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid 4x^2 + 4y^2 - 16y + 7 = 0\} \text{ and }$$

$$C = \{(x, y) \in \mathbf{R} \times \mathbf{R} \mid x^2 + y^2 - 4x - 2y + 5 \le r^2\},$$

Then the minimum value of |r| such that $A \cup B \subseteq C$ is equal to

- a) $\frac{3+\sqrt{10}}{2}$ b) $\frac{2+\sqrt{10}}{2}$

- c) $\frac{3+2\sqrt{10}}{2}$ d) $1+\sqrt{5}$

- 21) For real number α and β , consider the following system of linear equation: $x+y-z=2, x+2y+\alpha z=1, 2x-y+z=\beta$. If the system has infinite solution ,then $\alpha+\beta$ is equal to
- 22) Let $\overrightarrow{d} = \hat{i} + \hat{j} + \hat{k}$ and \overrightarrow{b} and $\mathbf{c} = \hat{j} \hat{k}$ be three vectors such that $\overrightarrow{d} \times \overrightarrow{b} = \overrightarrow{c}$ and $\overrightarrow{d} \cdot \overrightarrow{b} = 1$. If the length of projection vector of the vector \overrightarrow{b} on the vector $\overrightarrow{d} \times \overrightarrow{c}$ is 1, then the value of $3l^2$ is equal to
- 23) if $\log_3 2$, $\log_3 (2^x 5)$, $\log_3 (2^x \frac{7}{2})$ are in an arithmetic progression, then the value of x is equal to
- 24) Let the domain of the function $f(x) = \log_4 \left(\log_5 \left(\log_3 \left(18x x^2 77\right)\right)\right)$ be (a, b). Then the value of the integral $\int_a^b \frac{\sin^3 x}{\left(\sin^3 x + \sin^3(a + b x)\right)} dx$ is equal to
- 25) Let

$$f(x) = \begin{bmatrix} \sin^2 x & -2 + \cos^2 x & \cos 2x \\ 2 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & 1 + \cos 2x \end{bmatrix}, \quad x \in [0, \pi]$$

Then the maximum value of f(x) is equal to

26) Let $F: [3,5] \to \mathbf{R}$ be a twice differentiable function on (3,5) such that

$$F(x) = F(x) = e^{-x} \int_{3}^{x} (3t^2 + 2t + 4F'(t)) dt$$

If $F'(4) = \frac{\alpha e^{\beta} - 224}{(e^{\beta} - 4)^2}$, then $\alpha + \beta$ is equal to.

- 27) Let a plane P pass through the point (3,7,-7) and contain the line, $\frac{x-2}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$. If distance of the plane P from the origin is d,then d^2 is equal to .
- 28) Let $S = \{1, 3, 4, 5, 6, 7\}$. Then the number of possible function $f : \mathbb{S} \to \mathbb{S}$ such that $f(m.n) = f(m) \cdot f(n)$ for every $m, n \in S$ and $m.n \in S$ is equal to .
- 29) If $y = y(x), y \in [0, \frac{\pi}{2})$ is the solution of the differential equation

$$\sec(y)\frac{d}{dx}(y) - \sin(x+y) - \sin(x-y) = 0$$

then $5y'\left(\frac{\pi}{2}\right)$ is equal to.

30) Let $f: [0,3] \in \mathbf{R}$ be defined by

$$f(x) = min\{x - [x], 1 + [x] - x\}$$

where [x] is the greatest integer less than or equal to x.Let P denote the set containing all $x \in [0,3]$ where f is discontinuous, and Q denote the set containing all $x \in (0,3)$ where f is not differentiable. Then the sum of number of element in P and Q is equal to.