

Ans. to the Q. No: 1

$$\lim_{x \rightarrow 0} (1 + \sin x)^{\frac{1}{x}} = y$$

$$\Rightarrow \ln y = \lim_{x \rightarrow 0} \frac{1}{x} \ln (1 + \sin x)$$

$$\Rightarrow \ln y = \lim_{x \rightarrow 0} \frac{\ln (1 + \sin x)}{x}$$

$$\Rightarrow \ln y = \lim_{x \rightarrow 0} \frac{\cos x}{1 + \sin x}$$

$$\Rightarrow \ln y = \frac{1}{1}$$

$$\Rightarrow \ln y = 1$$

$$\Rightarrow y = e$$

[Proved]

Ans. to the Q. No: 2 (a)

$$\lim_{x \rightarrow 3^-} \frac{1}{|x-3|}$$

$$= \lim_{x \rightarrow 3^-} \frac{1}{-x+3}$$

$$= \frac{1}{-3+3}$$

$$= \infty \text{ (Indeterminate)} \quad \text{Ans}$$

$$y = \frac{1}{x} (x+1) \quad \text{and} \quad 0 < x$$

$$(x+1) \text{ and } \frac{1}{x} \quad \text{and} \quad y \text{ and } 0 < x$$

$$\frac{(x+1) \text{ and } 1}{x} \quad \text{and} \quad y \text{ and } 0 < x$$

$$\frac{x \text{ and } 1}{x+1} \quad \text{and} \quad y \text{ and } 0 < x$$

$$\frac{1}{1} = y \text{ and } 0 < x$$

$$1 = y \text{ and } 0 < x$$

$$1 = y \text{ and } 0 < x$$

$$[b \rightarrow \infty]$$

Q. 5.14 Ans. to the Q. No: 2 (b)

$$\lim_{x \rightarrow 4} \frac{4-x}{2-\sqrt{x}}$$

$$\Rightarrow \lim_{x \rightarrow 4} \frac{4-x}{2-\sqrt{x}} \cdot \frac{2+\sqrt{x}}{2+\sqrt{x}}$$

$$\Rightarrow \lim_{x \rightarrow 4} \frac{(4-x)(2+\sqrt{x})}{(2-\sqrt{x})(2+\sqrt{x})}$$

$$\Rightarrow \lim_{x \rightarrow 4} \frac{(4-x)(2+\sqrt{x})}{4+2\sqrt{x}-2\sqrt{x}-x}$$

$$\Rightarrow \lim_{x \rightarrow 4} \frac{(4-x)(2+\sqrt{x})}{(4-x)}$$

$$\Rightarrow \lim_{x \rightarrow 4} (2+\sqrt{x})$$

$$\Rightarrow 2 + \sqrt{4}$$

$$\Rightarrow 2 + 2$$

$$\Rightarrow 4 \text{ (Ans)}$$

$$\frac{x-\varepsilon}{2-\sqrt{x}} < \varepsilon \quad \text{or} \quad x < \varepsilon$$

$$\frac{x-\varepsilon}{2-\sqrt{x}+\sqrt{x}-\sqrt{x}} < \varepsilon \quad \text{or} \quad x < \varepsilon$$

$$\frac{x-\varepsilon}{(x-1)+(x-1)} < \varepsilon \quad \text{or} \quad x < \varepsilon$$

$$\frac{x-\varepsilon}{(x+1)+(x-1)} < \varepsilon \quad \text{or} \quad x < \varepsilon$$

$$\frac{x-\varepsilon}{x} < \varepsilon \quad \text{or} \quad x < \varepsilon$$

Ex. 11 Ans. to other Q. No: 2(c)

$$\lim_{x \rightarrow 4} \frac{3-x}{x^2-2x-8}$$

$(\frac{1}{n})$ rule for nil
0/0

$$\Rightarrow \lim_{x \rightarrow 4} \frac{3-x}{x^2-2x+4x-8}$$

$\Rightarrow (\frac{1}{n})$ rule $\geq 1 - \infty$

$$\Rightarrow \lim_{x \rightarrow 4} \frac{3-x}{x(x-2)+4(x-2)}$$

$\Rightarrow (\frac{1}{n})$ rule $\Rightarrow 5x - \infty$

$$\Rightarrow \lim_{x \rightarrow 4} \frac{3-x}{(4+4)(4-2)}$$

$\Rightarrow (\frac{1}{n})$ rule $\Rightarrow 5x - \infty$
0/0

$$\Rightarrow \frac{3-4}{(4+4)(4-2)}$$

$\Rightarrow (\frac{1}{n})$ rule $\Rightarrow 0 \infty$

$$\Rightarrow \frac{-1}{8 \cdot 2}$$

$0 = (\frac{1}{n})$ rule $\Rightarrow 0 \infty$

$$\Rightarrow -\frac{1}{16} \quad (\text{Ans})$$

Ans. to the Q. No : 3

$$\lim_{x \rightarrow 0} x^2 \sin\left(\frac{1}{x}\right)$$

$$\Rightarrow -1 \leq \sin\left(\frac{1}{x}\right) \leq 1$$

$$\Rightarrow -x^2 \leq x^2 \sin\left(\frac{1}{x}\right) \leq x^2$$

$$\Rightarrow \lim_{x \rightarrow 0} -x^2 \leq \lim_{x \rightarrow 0} x^2 \sin\left(\frac{1}{x}\right) \leq \lim_{x \rightarrow 0} x^2$$

$$\Rightarrow 0 \leq \lim_{x \rightarrow 0} x^2 \sin\left(\frac{1}{x}\right) \leq 0$$

$$\therefore \lim_{x \rightarrow 0} x^2 \sin\left(\frac{1}{x}\right) = 0$$

Ans. to the Q. No: 4

$$\lim_{x \rightarrow 0} \frac{|x|}{x}$$

$$\Rightarrow \frac{0}{0}$$

$$\therefore \lim_{x \rightarrow 0} \frac{|x|}{x}$$

$$\text{L.H.S} = \lim_{x \rightarrow 0^-} \frac{|x|}{x}$$

$$= \frac{0}{0}$$

$$[\lim_{x \rightarrow 0^-} \frac{|x|}{x} = \lim_{x \rightarrow 0^-} \frac{-x}{x} = -1]$$

$$\text{R.H.S} = \lim_{x \rightarrow 0^+} \frac{|x|}{x}$$

$$= \frac{0}{0}$$

$$= +1$$

$$\therefore \text{L.H.S} \neq \text{R.H.S}$$

\therefore limit dose not exist.

$$\frac{x+1}{x-1} \text{ mil}$$

$$\frac{x+1}{x-1} \in$$

$$1 - (1) = 0$$

$$\frac{x+1}{x-1} \in$$

$$1 - 1 = 0$$

$$\frac{0}{0} \in$$

$$\frac{x+1}{x-1} \text{ mil}$$

$$\frac{x+1}{x-1} \in$$

$$\frac{x+1}{x-1} \in$$

$$\frac{x+1}{x-1} \in$$

(ans)

Ans. to the Q. No: 5

$$\lim_{x \rightarrow -1} \frac{x^2 + 6x + 5}{x^2 - 3x - 4}$$

$$\Rightarrow \frac{(-1)^2 + 6(-1) + 5}{(-1)^2 - 3(-1) - 4}$$

$$\Rightarrow \frac{1 - 6 + 5}{1 + 3 - 4}$$

$$\Rightarrow \frac{0}{0}$$

$$\therefore \lim_{x \rightarrow -1} \frac{x^2 + 6x + 5}{x^2 - 3x - 4}$$

$$\Rightarrow \lim_{x \rightarrow -1} \frac{2x + 6}{2x - 3}$$

$$\Rightarrow \frac{2(-1) + 6}{2(-1) - 3}$$

$$\Rightarrow \frac{-2 + 6}{-2 - 3}$$

$$\Rightarrow -\frac{4}{5}$$

Ans

[L'Hopital's rule]

$$\frac{2x + 6}{2x - 3} = \frac{2}{2} = 1$$

$$\frac{2}{2} = 1$$

$$1 + 1 = 2$$

$$2 + 2 = 4$$