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Sub: Math

Std: 11th

16/24

Q-1)

2)

3)

→ Rationalization numerator

$$\frac{\sqrt{6+x+x^2}-\sqrt{6}}{x} \times \frac{\sqrt{6+x+x^2}+\sqrt{6}}{\sqrt{6+x+x^2}+\sqrt{6}}$$

$$= \frac{(\sqrt{6+x+x^2})^2 - (\sqrt{6})^2}{x(\sqrt{6+x+x^2}+\sqrt{6})}$$

$$= \frac{6+x+x^2-6}{x(\sqrt{6+x+x^2}+\sqrt{6})}$$

$$= \frac{x-x^2}{x(\sqrt{6+x+x^2}+\sqrt{6})}$$

04

$$= \frac{x(1+x)}{x(\sqrt{6+x+x^2}+\sqrt{6})}$$

Now $x \rightarrow 0$, $x=0$

$$= \frac{1+0}{\sqrt{6+0+0^2}+\sqrt{6}}$$

$$= \frac{1}{\sqrt{6}+\sqrt{6}} = \frac{1}{2\sqrt{6}}$$

$$5) \rightarrow \lim_{x \rightarrow 0} \frac{3^x - 2^x}{x}$$

Add & less 1 from numerator

$$= \lim_{x \rightarrow 0} \left[\frac{3^x - 1 - 2^x + 1}{x} \right]$$

$$= \lim_{x \rightarrow 0} \left[\frac{(3^x - 1) - (2^x + 1)}{x} \right]$$

$$= \lim_{x \rightarrow 0} \left[\frac{(3^x - 1)}{x} \right] - \lim_{x \rightarrow 0} \left[\frac{(2^x + 1)}{x} \right]$$

$$= \log 3 - \log 2$$

$$= \log \left[\frac{3}{2} \right]$$

04

2)

$$= \lim_{x \rightarrow 0} \left[\frac{(5 \times 3)^x - 3^x - 5^x + 1}{x^2} \right]$$

$$= \lim_{x \rightarrow 0} \left[\frac{5^x \times 3^x - 3^x - 5^x + 1}{x^2} \right]$$

$$= \lim_{x \rightarrow 0} \frac{5^x (5^x - 1) - (5^x - 1)}{x^2}$$

$$= \lim_{x \rightarrow 0} \frac{(5^x - 1)(3^x - 1)}{x^2}$$

$$= \lim_{x \rightarrow 0} \frac{5^x - 1}{x^2} \times \frac{3^x - 1}{x^2}$$

04

Use $\frac{a^x - 1}{x} = \log a$

$\therefore (\log 5) \cdot (\log 3)$

8) $\rightarrow \lim_{x \rightarrow 0} \left[\frac{\log(1+6x)}{x} \right]$

$= \lim_{x \rightarrow 0} \left[\frac{\log(1+6x)}{6x} \times 6 \right]$

04

$= 6 \times 1$
 $= 6$