

Find the limits of the following using appropriate method:

$$1. \lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4}$$

$$2. \lim_{x \rightarrow -2} \frac{x^2 - 4}{x + 2}$$

$$3. \lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 + 2x - 3}$$

$$4. \lim_{x \rightarrow 7} \frac{x^2 + 2x - 63}{x^2 - 10x + 21}$$

$$5. \lim_{x \rightarrow 0} \frac{x^3 + 5x^2 + 11x}{7x^2 + 2x}$$

$$6. \lim_{x \rightarrow 3} \left[ \frac{1}{x-3} - \frac{3}{x^2 - 3x} \right]$$

$$7. \lim_{x \rightarrow 0} \frac{x^2 + 2x + 5}{x^2 + 3x + 1}$$

$$8. \lim_{x \rightarrow 1} \frac{\sqrt{x} - 2}{x - 4}$$

$$9. \lim_{x \rightarrow 1} \frac{x + 3}{\sqrt{x + 4} - 1}$$

$$10. \lim_{x \rightarrow 1} \frac{\sqrt{3+x} - \sqrt{5-x}}{x^2 - 1}$$

Examine the continuity of following functions:

$$1. f(x) = \frac{x^2 - 5x + 6}{x^2 - 3x + 2} \quad \text{At } x=2 \text{ and } x=3$$

$$2. f(x) = \begin{cases} x & \text{when } 0 \leq x < \frac{1}{2} \\ 1 & \text{when } x = \frac{1}{2} \\ 1-x & \text{when } \frac{1}{2} < x < 1 \end{cases}$$

$$\text{At } x = \frac{1}{2}$$

$$3. f(x) = \begin{cases} \frac{x^2 - 16}{x - 4}, & x \neq 4 \\ 8, & x = 4 \end{cases}$$

$$\text{At } x=4$$

$$4. f(x) = \begin{cases} 2x & \text{when } 0 \leq x < 1 \\ 3 & \text{when } x = 1 \\ 4 - 2x & \text{when } 1 < x \leq 2 \end{cases}$$

$$\text{At } x=1$$