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Course: Engineering Mathematics.

$$1. \lim_{x \rightarrow 3} f(x)$$

$$x \rightarrow 3$$

$$f(x) = x$$

$$\lim_{x \rightarrow 3} x = x$$

$$x \rightarrow 3$$

$$(2) \lim_{x \rightarrow 6} f(x)$$

$$x \rightarrow 6$$

$$\lim_{x \rightarrow 6} (5x - 21)$$

$$x \rightarrow 6$$

x	$f(x)$
6.1	9.5
6.01	9.05
6.001	9.005
6.0001	9.0005
6.00001	9.00005
6.000001	9.000005
6.0000001	9.0000005

Hence $f(x) = 5x - 21$ tends towards 9 as $x \rightarrow 6$

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

$$\lim_{h \rightarrow 0} \left(\frac{3 - (3+h)}{3 - (3+h)} \right) = \frac{0}{0}$$

limit is indeterminate at right hand limit

$$\lim_{x \rightarrow 3} |x-3|$$

$$x > 0$$

$$\lim_{x \rightarrow 0^+} \left[\begin{array}{l} (3+h)-3 \\ |3+h-3| \end{array} \right]$$

$$x < 0$$

$$\lim_{x \rightarrow 25} \left[\begin{array}{l} 3-h-3 \\ |3-h-3| \end{array} \right]$$

$$\frac{3-3}{3-3} = \frac{0}{0} \text{ indeterminate}$$

hence limits do not exist from both left and right hand limit

at point $x=4$

$$P(x) = \sqrt{x-4}$$

$$\lim_{x \rightarrow 8} \sqrt{x-4} = \sqrt{8-4}$$

$$\lim_{x \rightarrow 4} \sqrt{x-4} = \sqrt{4-4}$$

$$= \sqrt{4}$$

$$= \sqrt{0} = 0$$

$$= 2$$

$$f(x) = \sqrt{x-4}$$
$$= \sqrt{4-4} = \sqrt{0} = 0$$

$$\lim_{x \rightarrow (4, 8)} f(x) = f(4, 8)$$

$$f(x) = \sqrt{x-4}$$
$$= \sqrt{8-4} = \sqrt{4} = 2$$

Hence $f(x)$ is continuous at $(4, 8)$