BASSEY SAVIOUR JOSEPH
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① $f(x) = \pi$

$\lim_{x \to 3} \pi = \pi$

② $\lim_{x \to 6} (5x - 21)$

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 $f(x) = 5x - 21$

③ $\lim_{x \to 3} \frac{3-x}{(3-x)} = \frac{3-(3+x)}{3-(3+x)} = \frac{0}{0}$ RHS

The limit of the right hand side is indeterminate

④ $\lim_{x \to 3} \frac{x-3}{(x-3)}$

$x \geq 0$

$\lim_{x \to 0} \left[\frac{[(3+x)-3]}{([3+x]-3)}\right]$

$= \frac{3-3}{3-3} = 0$; Indeterminate

$x < 0$

$$\lim_{x \to 0} \left[\frac{([3-x]-3)}{([3-x]-3)} \right] = \frac{3-3}{3-3} = 0 \text{; indeterminate}$$

∴ The limit doesn't exist from the left to the right hand limit.

(5) $f(x) = \sqrt{x-4}$ (intervals 4, 8)

At $x = 4$

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

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

$= \sqrt{0} = 0$

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

At $x = 8$

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

$= \sqrt{4}$

$= 2$

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

$\lim_{x \to [4,8]} f(x) = f(4,8)$

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