

SL Math: Limits & Derivatives KEY

Evaluate each limit by factoring and canceling.

$$[1] \lim_{x \rightarrow 5} \frac{x^2 - 10x + 25}{x^2 - 25} = 0$$

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

$$[3] \lim_{x \rightarrow -2} \frac{x^2 - 2x - 8}{x^2 + 6x + 8} = -3$$

Evaluate each limit by multiplying top and bottom by the conjugate of the numerator.

$$[4] \lim_{x \rightarrow 5} \frac{\sqrt{x+4} - 3}{x-5} = \frac{1}{6}$$

$$[5] \lim_{x \rightarrow 12} \frac{\sqrt{2x+1} - 5}{x-12} = \frac{2}{10}$$

$$[6] \lim_{x \rightarrow 10} \frac{\sqrt{x-6} - 2}{x-10} = \frac{1}{4}$$

Find each derivative value by evaluating $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$.

$$[7] \text{ Find } f'(2) \text{ for } f(x) = x^2 + 2 \qquad f'(2) = 4$$

$$[8] \text{ Find } f'(4) \text{ for } f(x) = x^2 + x + 1 \qquad f'(4) = 9$$

$$[9] \text{ Find } f'(2) \text{ for } f(x) = \sqrt{x+7} \qquad f'(2) = \frac{1}{6}$$

$$[10] \text{ Find } f'(1) \text{ for } f(x) = \sqrt{3x+1} \qquad f'(1) = \frac{3}{2\sqrt{5}}$$