

$$6. f(x) = 3x + 2$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\lim_{h \rightarrow 0} \frac{3(x+h) + 2 - (3x + 2)}{h}$$

$$\lim_{h \rightarrow 0} \frac{\cancel{3x} + 3h + 2 - \cancel{3x} - 2}{h} = \boxed{3}$$

$$\boxed{f'(x) = 3}$$

$$\frac{3h}{h}$$

$$f(x) = \sqrt{x-9}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\lim_{h \rightarrow 0} \frac{\sqrt{x+h-9} - \sqrt{x-9}}{h} \left(\frac{\sqrt{x+h-9} + \sqrt{x-9}}{\sqrt{x+h-9} + \sqrt{x-9}} \right)$$

$$\lim_{h \rightarrow 0} \frac{x+h-9 - x+9}{h(\sqrt{x+h-9} + \sqrt{x-9})} = \frac{h}{h(\sqrt{x+h-9} + \sqrt{x-9})}$$

$$\lim_{h \rightarrow 0} \frac{1}{\sqrt{x+h-9} + \sqrt{x-9}} = \frac{1}{\sqrt{x-9} + \sqrt{x-9}} = \frac{1}{2\sqrt{x-9}}$$

plug in $h=0$

$$f(x) = \frac{2}{x^2}$$

$$\lim_{h \rightarrow 0} \frac{\frac{2}{(x+h)^2} - \frac{2}{x^2}}{h} \cdot \frac{(x^2)(x+h)^2}{(x^2)(x+h)^2}$$

$$\lim_{h \rightarrow 0} \frac{2x^2 - 2(x+h)^2}{hx^2(x+h)^2}$$

$$\lim_{h \rightarrow 0} \frac{2x^2 - 2(x^2 + 2xh + h^2)}{hx^2(x+h)^2}$$

$$\lim_{h \rightarrow 0} \frac{\cancel{2x^2} - \cancel{2x^2} - 2xh - 2h^2}{hx^2(x+h)^2}$$

$$\lim_{h \rightarrow 0} \frac{-2xh - 2h^2}{hx^2(x+h)^2} \xrightarrow{h \rightarrow 0} \frac{-2h(x+h)}{hx^2(x+h)^2}$$

$$\lim_{h \rightarrow 0} \frac{-2\cancel{(x+h)}}{x^2(x+h)^2}$$

$$\frac{-2}{x^2 \cdot x} = \boxed{\frac{-2}{x^3}}$$

$$f'(x) = \frac{-2}{x^3}$$