

Name: _____

Use the **limit definition** to find $f'(x)$ for $f(x) = \frac{8}{x}$

$$\begin{aligned} f'(x) &= \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \\ &= \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{8}{x+h} - \frac{8}{x} \right] \\ &= \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{8x - 8(x+h)}{(x+h)x} \right] \\ &= \lim_{h \rightarrow 0} \frac{1}{\cancel{h}} \left[\frac{-8\cancel{h}}{(x+h)x} \right] \\ &= \lim_{h \rightarrow 0} \frac{-8}{(x+h)x} \\ &= \frac{-8}{x^2} \end{aligned}$$