

Exercise 40

Each limit represents the derivative of some function f at some number a . State such an f and a in each case.

$$\lim_{x \rightarrow 1/4} \frac{\frac{1}{x} - 4}{x - \frac{1}{4}}$$

Solution

Recall that the derivative of $f(x)$ is defined by

$$f'(x) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}.$$

Comparing this to the given limit,

$$f(x) = \frac{1}{x},$$

and its derivative is being evaluated at $a = \frac{1}{4}$.