

**Exercise 5**

Differentiate the function.

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

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**Solution**

Take the derivative of the function using the chain rule.

$$\begin{aligned} f'(x) &= \frac{d}{dx} \left( \ln \frac{1}{x} \right) \\ &= \frac{1}{\frac{1}{x}} \cdot \frac{d}{dx} \left( \frac{1}{x} \right) \\ &= x \cdot \frac{d}{dx} (x^{-1}) \\ &= x \cdot (-x^{-2}) \\ &= -x^{-1} \\ &= -\frac{1}{x} \end{aligned}$$