

Quiz 4 - Sections 3.1, 3.2, 3.3

Name: *Solution*

1. Use a difference quotient to find the derivative of $f(x) = 2x$

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

$$= \lim_{\Delta x \rightarrow 0} \frac{2(x+\Delta x) - 2x}{\Delta x}$$

$$= \lim_{\Delta x \rightarrow 0} \frac{2\Delta x}{\Delta x}$$

$$= \lim_{\Delta x \rightarrow 0} 2$$

$$= 2$$

2. Find the derivatives of the following functions:

a. $f(x) = x^2 + x^{-1} + \pi$

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

b. $f(x) = x^2 \ln x$

$$f'(x) = x^2 \left(\frac{1}{x}\right) + (\ln x) 2x$$

$$= x + 2x \ln x$$