

NAME: _____

Math 103L: Product, Quotient, and Generalized Power rules (Sections 11.3-4)

These problems are a sample of the kinds of problems that may appear on the final exam. Some answers are included to indicate what is expected. Problems that require a summary statement are marked with Sum. The summary statements should be written in complete sentences and they should include the units of measurement for all quantities mentioned in the summary.

1. (Worked Problem: READ IT!) Find the derivatives of the following functions and simplify.

(a) $f(x) = -(x - 2)^2 + 3$

(b) $s(x) = 3x^2 + 5x + 100$

(c) $r(x) = \frac{3x - 2}{(2x + 5)^2}$

Answer:

$$f'(x) = -2(x - 2)$$

$$s'(x) = 6x + 5$$

$$\begin{aligned} r'(x) &= \frac{3(2x + 5)^2 - 2(2x - 5)(2)(3x - 2)}{(2x - 5)^4} \\ &= \frac{3(2x + 5) - 4(3x - 2)}{(2x - 5)^3} \\ &= \frac{-6x + 23}{(2x - 5)^3} \end{aligned}$$

2. Let $f(x) = (x^2 - x + 1)^3$.

a. Find the derivative $f'(x)$.

b. Find $f'(1)$.

3. Find the derivative of the function

$$f(x) = (x^3 + 4x + 1)(150 - 3x).$$

4. Find the derivative of the function

$$f(x) = \sqrt{3 - 5x}.$$

5. Find the derivatives of the following functions and simplify.

(a) $f(x) = -(x - 2)^2 + 3$

(b) $s(x) = 3x^2 + 5x + 100$

(c) $r(x) = \frac{3x - 2}{(2x + 5)^2}$