Math 203 Spring 2019 Professor MG
Classwork 13   Name: _____

Show all work and circle/box your final answer. All answers must be simplified unless stated otherwise.

1. When a company produces and sells x thousand units per week, its total weekly profit is P thousand dollars, where
$$P = \frac{200x}{100 + x^2}$$
   The production level at t weeks from the present is $x = 4 + 2t$

   (a) Find the marginal profit $\dfrac{dP}{dx}$ (you don't need to simplify your answer)

   (b) Find the time rate of change of the profit $\dfrac{dP}{dt}$ (you don't need to simplify your answer)

2. A company that manufactures sport supplements calculates that its costs and revenue can be modeled by the equations:
$$C(x) = 125,000 + \frac{3}{4}x \text{ and } R(x) = 250x - \frac{1}{10}x^2$$
   where x is the number of units of sport supplements produced in one week. When production is at 1000 supplements, it is increasing at a rate of 150 supplements per week. Find the (time) rates of change at which the cost, revenue, and profit are changing when $x = 1000$.

3. Use logarithmic differentiation to find the derivative of:

   (a) $f(x) = \dfrac{x^{2/3}(x-3)^{4/3}}{(2x+5)^{5/3}}$

   (b) $f(x) = (x^2 + 7)^5(4x - 1)^2(x + 14)$

   (c) $f(x) = \dfrac{(x+1)^4(2x+1)^7(2x+1)^3}{\sqrt{4x+1}}$