

BUSINESS CALCULUS

QUIZ 3 – DIFFERENTIATION

1. Solve the following *basic* derivatives using the power, constant and logarithm rules:

a)  $f(x) = 7x^3$      $f'(x) =$  \_\_\_\_\_

b)  $g(x) = 4x^{-3}$      $g'(x) =$  \_\_\_\_\_

c)  $h(y) = 3y^{4.5} - 2y^{3.3} - 7y^{2.1} + 2y^{-1.8}$      $h'(y) =$  \_\_\_\_\_

d)  $R(x) = 3e^x$      $R'(x) =$

e)  $Q(t) = 5\ln(t)$      $Q'(t) =$

2. Use the product and/or quotient rule as appropriate: Type equation here.

a)  $C(x) = (3x^3)e^x$      $C'(x) =$

b)  $f(t) = \frac{3t+e^t}{2t^3-5}$      $f'(t) =$

3. The next problems involve all of the above rules, and include the chain rule. (hint: sometimes it is easier to apply log rules *first*, then differentiate.)

a)  $g(t) = (2t^3 - t^2)^3$      $g'(t) =$

b)  $h(z) = e^{3z^2} + \frac{z^2 \ln(z)}{z-1}$      $h'(z) =$

c)  $f(w) = \log_2(w^3 - 3w)$      $f'(w) =$

d)  $h(s) = \ln(e^{s^4 - 2s^2})$      $h'(s) =$

4. The cost and revenue functions for North Vernon GPS Devices (NV GPS).

$R(x) = 160 + 220x - 1.5x^2$ , where x is in number of GPS units manufactured

$C(x) = 1.2x^2 + 7.2x - 13.3$ , where x is in number of GPS units manufactured

a) What are the marginal cost, marginal revenue and marginal profit functions for NV GPS?

b) How many units must be manufactured for the maximum profit?