Name:
Section 3.1 - In class example
Math 151 – Spring 2018

1. Find the derivative for each of the following

   (a) $y = 3t^5 - 5\sqrt{t} + \dfrac{7}{t}$
   $y' = 15t^4 - \dfrac{5}{2}t^{-1/2} - \dfrac{7}{t^2}$

   (b) $y = \sqrt{x}(x+1)$
   $y' = \dfrac{3}{2}x^{1/2} + \dfrac{1}{2}x^{-1/2}$

2. Find the equation to the tangent line to the graph of $f(x) = 2x^3 - 5x^2 + 3x - 5$ at $x = 1$.
   $f'(x) = 6x^2 - 10x + 3,$ so $f'(1) = -1$
   The equation of the tangent line is $y = -4 - x$.

3. The demand for a product is given, for $p, q \geq 0$, by $p = f(q) = 50 - 0.03q^2$.

   (a) Find the $p-$ and $q-intercepts$ for this function and interpret them in terms of demand for this product.
   p-intercept is the value of q when $q = 0$, so $p = f(0) = 50$.
   The q-intercept is the value of q such that $p = f(q) = 0 \longrightarrow 50 - 0.03q^2 = 0$. Solving yeilds $q = \sqrt{\frac{50}{0.03}}$. The p-intercept represents the price at which demand is zero. That is, when the price reaches 50 dollars, demand for the product will be zero. The q-intercept represents the demand for the product if the product were being given away free of charge.

   (b) Find $f(20)$ and give units with your answer. Explain what it tells you in terms of demand.
   $f(20) = 38 dollars.$
   This tells us that if the price per unit is \$38, then a total of 20 units are demanded.

   (c) Find $f'(20)$ and give units with your answer. Explain what it tells you in terms of demand.
   $f'(q) = -0.06q$. Therefore $f'(20) = -1.2$ dollars per unit demanded. This means that if the quantity demanded increases from 20 to 21, then the price should have decreased by 1.2 dollars. Alternatively, if the price increases from 38 to 39, the quantity demanded will drop by 1.