Sections 3.1 and 3.2
Derivative Formulas for Polynomial, Exponential, and Logarithmic Functions

1. For $p, q \geq 0$, the demand for a product is given 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.

(b) Find $f(20)$ and give units with your answer. Explain what it tells you in terms of demand.

(c) Find $f'(20)$ and give units with your answer. Explain what it tells you in terms of demand.

2. If the demand curve is a line, it can be written as $p = b + mq$, where p is the price of the product, q is the quantity sold at that price, and b and m are constants.

(a) Write an equation for revenue as a function of the quantity sold.

(b) Find the marginal revenue function.

3. Find the quadratic polynomial $g(x) = ax^2 + bx + c$ which best fits the function $f(x) = e^x$ at $x = 0$, in the sense that

$$g(0) = f(0), \qquad g'(0) = f'(0), \quad \text{and} \ g''(0) = f''(0).$$

Using your calculator, sketch graphs of f and g on the same axes. What do you notice?