Essentials of Calculus Homework 3.2 Exponentials and logarithms

- 1. For each function f(x), find f'(x).
 - a) $f(x) = 10^{x}$ b) $f(x) = 2x^{3} + 3 \cdot 2^{x}$ c) $f(x) = 9x^{4} - 5x + 3 - 5 \cdot 2^{x}$ d) $f(x) = 5 \cdot 3^{x} + 3 \cdot 5^{x}$ e) $f(x) = 2x^{3} - 5x + 2e^{x}$ f) $f(x) = 6e^{x} + 6x^{7} - 3\ln(x)$ g) $f(x) = 5\ln(x) - \frac{5}{x}$
- 2. Let $f(x) = 3x^2 + x 2e^x$.
 - a) Find f'(0), f'(1) and f'(2).
 - b) Find an equation for the tangent line at x = 0.
- 3. Let $f(x) = 3x^2 + 2\ln(x)$. Find an equation for the tangent line at x = 1.
- 4. If \$100 is put in a bank at 5% yearly interest, compounded continuous, in t years there will be $f(t) = 100e^{0.05t}$ dollars. Find f(5) and f'(5), with units. Say what they represent.
- 5. A certain car is worth $f(t) = 5000e^{-0.05t}$ dollars in *t* years. Find f(10) and f'(10), with units. Say what they represent.
- 6. The human population of a certain region t years from now is given by $P(t) = 10000(.995)^t$. Find P(50) and P'(50), with units, and give their interpretation.
- 7. It costs a company $C(q) = 500 + 200 \ln(q)$ dollars to make q objects. Find the total cost and marginal cost at a production level of q = 100 objects.