1. Solve the following equations for x.
   (a) $3x^2 - 8x - 2 = 0$.

2. Suppose the price function for a product of a company is $p(x) = -2x + 100$, where x is the quantity sold in a given week and. In addition, suppose the company has to pay a fixed cost of \$40, plus a variable cost of \$4 per unit.
   (a) Find the profit function, $P(x)$.

   (b) Find the max of the profit function and interpret each coordinate.

3. Let $h(x) = \sqrt[3]{2x - 1}$.
   (a) Write the domain of h in interval notation.

   (b) Are there any values for x in the domain of h where h is non-differentiable? Justify your answer.

4. Suppose Dan invests \$2000 into an account with an annual rate of 5.1%. How much money will be in the account after 8 years if the interest is simple or compounded continuously respectively?

5. Let $f(x) = e^{2x} + x$. Find an equation for the line tangent to the graph of $f(x)$ at $x = 1$.

6. Find the derivative of the following functions.

   (a) $A(x) = x \ln(2x + 1)$.

   (b) $B(x) = \dfrac{2^x}{x - 1}$.

(c) $C(x) = \log_6 \sqrt{x}$.

(d) $D(x) = 5e^{2x^2}$.

7. Let $f(x) = x^3 - 3x^2 - 9x - 2$.

(a) Find the interval(s) on which f is increasing/decreasing.

(b) Identify the values of x at which f achieves a relative max or min. You don't need to find the y values.

(c) Find the interval(s) on which f is concave up/down.

(d) Find the inflection point(s) of f.

8. Consider the equation $3x^2 + \ln y = x - 2y^2$. Determine $\dfrac{dy}{dx}$.

9. Consider the function $f(x) = \dfrac{1}{3}x^3 - 2x^2 + 3x + 2$ on the interval $[0, 2]$. Find the absolute max and absolute min of f on this interval.

10. Let $f(x) = \dfrac{1}{2\sqrt{x}} + 4x$.

(a) Determine the indefinite integral $\displaystyle\int f(x)\ dx$.

(b) Determine the definite integral $\displaystyle\int_1^4 f(x)\ dx$.

11. Consider the function $f(x) = x^2 - 1$ on the interval $[-1, 3]$.

(a) Compute the net area beneath the graph of f.

(b) Compute the gross area between the graph of f and the x-axis.

12. Suppose you want to make an open top box out of a square piece of corrugated cardboard that is 24 inches on each side. In order to do this, you must cut square pieces out of the corners, and then fold up the flaps. Determine the dimensions of the box so that its volume is a maximum. What is the maximum volume?