The First Derivative Test

The point where a function changes from:

Increasing to Decreasing is a local and/or absolute maximum.
Decreasing to Increasing is a local and/or absolute minimum.

Outcomes: Identify the Maximum and Minimum of functions using the first derivative test.

1. a) State the interval in which the following function is increasing and decreasing.
   $y = x^3 + 6x^2 + 9x + 2$
   b) State the value where the first derivative is equal to zero.
   c) How can you use intervals of increase and decrease to determine if you have a max or min?

2. a) State the interval in which the following function is increasing and decreasing. $y = x^3$
   b) State the value where the first derivative is equal to zero in the function $y = x^3$.
   c) Is this value a maximum or minimum?

3. Find the maximums and minimums for the following functions. Are they local or absolute max/min values? Sketch the graphs.
   a) $f(x) = x^3 - 3x + 1$
   b) $y = x^4 - 4x^3 - 8x^2 - 1$
   c) $f(x) = 2 - 2x^{-\frac{1}{3}}$
   d) $f(x) = x^3 - 3x$

4. Find the absolute maximum and minimum values of the function.
   $f(x) = x^3 + 6x^2 + 9x + 2$, in $-3.5 \le x \le 1$

Homework: Page 182 #1 – 4 every second letter.