Definition of the Derivative – show work on your own paper!

1. Use the definition of the derivative to find f' for $f(x) = 2x^2$.

2. Draw a graph of $f(x) = 2x^2$. Use the answer to question 1 to label the slopes at x values of -2, -1, 0, 1 and 2.

3. Use the definition of the derivative to find f' for $f(x) = \dfrac{1}{x}$.

4. Draw a graph of $f(x) = \dfrac{1}{x}$.

   Use the answer to question 3 to label the slopes at x values of -2, -1, 0, 1 and 2 on your graph.

5. Use the definition of the derivative to find the instantaneous slope of $f(x) = x^3 - 2$ at x = -2.

6. Use your graphing calculator to graph $f(x) = \sin x$ and its derivative on the same grid.

7. Consider $f(x) = x^2 - 2x + 1$

   a. Sketch a graph of $f(x)$.

   b. Use the definition of the derivative to find $f'(x)$.

   c. Find $f'(2)$ and $f'(-2)$.

   d. Verify the answer to 7c in 2 ways with your graphing calculator.

8. Consider $f(x) = -3x + 1$

   a. Sketch a graph of $f(x)$.

   b. Use the definition of the derivative to find $f'(x)$.

   c. Find $f'(1)$ and $f'(7)$.

   d. Verify the answer to 7c in 2 ways with your graphing calculator.

9. Consider $f(x) = \sqrt{x}$

   a. Sketch a graph of $f(x)$.

   b. Use the definition of the derivative to find $f'(x)$.

   c. Find $f'(0)$ and $f'(3)$.

   d. Verify the answer to 7c in 2 ways with your graphing calculator.

10. Consider $f(x) = -2x \sin x$

    a. Use your graphing calculator to sketch a graph of f(x).

    b. Find $f'(\pi)$

    c. What is the meaning of the answer to part 10b?