Derivate Worksheet

1. What does it mean for a function if its derivative at a certain point is negative? What about if the derivative is positive? Zero?

2. For each of the following equations, sketch the tangent lines to the graph at $x = -2$, $x = 0$, and $x = 2$.

3. What is the slope of each of your tangent lines?
   - Graph 1, $x = -2$: Slope = ________
   - Graph 1, $x = 0$: Slope = ________
   - Graph 1, $x = 2$: Slope = ________
   - Graph 2, $x = -2$: Slope = ________
   - Graph 2, $x = 0$: Slope = ________
   - Graph 2, $x = 2$: Slope = ________
   - Graph 3, $x = -2$: Slope = ________
   - Graph 3, $x = 0$: Slope = ________
   - Graph 3, $x = 2$: Slope = ________

4. What do these tell you about the derivatives of the functions at those points?
5. Without plotting a tangent line, can you determine whether the derivative of the graph of \(x^2\) (the middle graph) is positive or negative at \(x = 4\)? How do you know? (hint: is the graph sloping upward or downward?)

6. Using the Derivate applet, input the equation \(y = \frac{x^2}{2}\). Find the derivative at the following points and plot them on the graph provided.

   \(x = -5\), Derivative = ________
   \(x = -3\), Derivative = ________
   \(x = -1\), Derivative = ________
   \(x = 0\), Derivative = ________
   \(x = 1\), Derivative = ________
   \(x = 3\), Derivative = ________
   \(x = 5\), Derivative = ________

7. Do these points seem to form a graph? If so, what equation might describe the graph?