Math 131 - August 29, 2014
Solutions

Warm-up Problems

A *secant* line is a line connecting two points on a graph. So, for Problem 1a below, you are finding the line between points $(1, f(1)) = (1, 1)$ and $(5, f(5)) = (5, 25)$.

1. Let $f(x) = x^2$.

   (a) Find the slope of the *secant* line connecting the points on the graph of f corresponding to $x = 1$ and $x = 5$.
   Solution: $m = \frac{25-1}{5-1} = \frac{24}{4} = 6$, $y = 6x - 5$

   (b) Find the slope of the *secant* line connecting the points on the graph of f corresponding to $x = 1$ and $x = 4$.
   Solution: $m = \frac{16-1}{4-1} = \frac{15}{3} = 5$, $y = 5x - 4$

   (c) Find the slope of the *secant* line connecting the points on the graph of f corresponding to $x = 1$ and $x = 3$.
   Solution: $m = \frac{9-1}{3-1} = \frac{8}{2} = 4$, $y = 4x - 3$

   (d) Find the slope of the *secant* line connecting the points on the graph of f corresponding to $x = 1$ and $x = 2$.
   Solution: $m = \frac{4-1}{2-1} = \frac{3}{1} = 3$, $y = 3x - 2$

   (e) Find the slope of the *secant* line connecting the points on the graph of f corresponding to $x = 1$ and $x = 1$.
   Solution: $m = \frac{1-1}{1-1} = \frac{0}{0} = 2$, $y = 2x - 1$

2. Find the equations of the secant lines in Problem 1.

Lecture Problems

3. Using the method of class, find the slope of the tangent line at the given point.

   (a) $f(x) = x^2$, $x = 2$
   Solution: slope $= 4$, Line: $y = 4x - 4$

   (b) $f(x) = x^2$, $x = 5$
   Solution: slope $= 10$, Line: $y = 10x - 25$

   (c) $f(x) = 3x + 1$, $x = 2$
   Solution: slope $= 3$, Line: $y = 3x + 1$

   (d) $f(x) = 3x^2 - 2x$, $x = 1$
   Solution: slope $= 4$, Line: $y = 4x - 3$

   (e) $f(x) = 3x^2 - 2x$, $x = -3$
   Solution: slope $= -20$, Line: $y = -20x - 27$

4. Using the slopes in Problem 3, find the equation of the tangent lines.