

# Discussion Problems for Math 180

Thursday, January 15, 2015

## *Review*

1. Consider a  $30^\circ - 60^\circ - 90^\circ$  right triangle with a hypotenuse one unit long. How long are the other two sides of the triangle?

2. Rewrite the expression

$$\frac{1}{1 - \sqrt{2}}$$

in such a way that there are no radicals in the denominator.

3. What is the slope of the line which is the graph of the equation  $7x - 3y + 2 = 0$ ?

## *This time*

4. Consider the function  $y(x) = x - x^2$ .

(a) Find the average rate of change of this function on the interval  $[0, 1]$ .

(b) ... on the interval  $[0, \frac{1}{2}]$ .

(c) ... on the interval  $[0, h]$ . (Of course now instead of a number you'll get a function of  $h$ .)

(d) Sketch a graph of your answer to part (c) as a function of  $h$ . Label the graph clearly, and be careful about the domain.

(e) Looking at the graph from part (d), speculate as to the instantaneous rate of change of  $y$  at  $x = 0$ .

(f) Using your answer from part (e), write an equation for the tangent line to the graph of  $y = x - x^2$  at the point  $(0, 0)$ .

5. Consider the function  $s(t) = 1 + \sqrt{t}$ .

(a) What is the average rate of change of  $s(t)$  on the interval  $[1, 4]$ ?

(b) ... on the interval  $[1, \frac{9}{4}]$ ?

(c) ... on the interval  $[1, 1 + h]$ ?

(d) Can you use your answer to part (c) to speculate as to the instantaneous rate of change of  $s(t)$  at  $t = 1$ ? (This will probably require you to do some algebra.)