Math 122B-020, Fall 2014 Homework 1. Due 9/25/14 in class.

- **Please show all work neatly on your own paper. Do not show me 'scratch' work - your solutions should be logical and easy to follow, with your answer clearly marked if needed. Avoid unnecessary arrows, scribbles, boxes, or otherwise chaotic behavior.**
- Problems marked with a star have hints at the end.
- A 'valid' interpretation is a complete, logical sentence which includes values and units. Example:

  Suppose $V(t)$ gives the volume of a gas (in cubic feet) at time t (in seconds).
  Interpret $V'(1) = 2$.

  - **Invalid:** The derivative of V is 2.
  - **Invalid:** $\frac{dV}{dt} = 2$
  - **Invalid:** The volume is increasing.
  - **Invalid:** When $t = 1$, the volume is increasing at a rate of 2.
  - **Valid:** When $t = 1$ second, the volume of the gas is increasing at a rate of 2 cubic feet per second.

- Remember, your quiz on Thursday will include 2-3 questions very similar to some of these, so use this as study time!

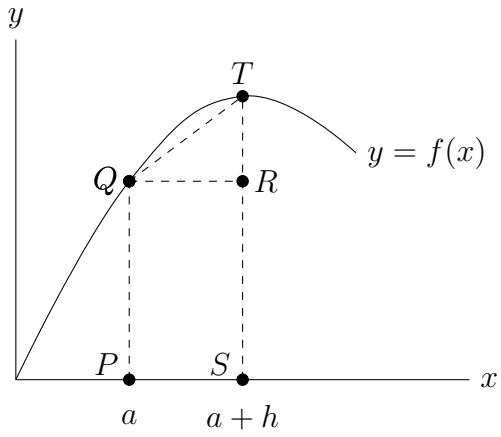
1. Book problems (It looks like a lot, but they are short)

- Section 2.1 # 10,11,12,17*,28
- Section 2.2 # 8,12,20,24*,30*
- Section 2.3 # 8,10,15,23*,48*,49*
- Section 2.4 # 4,18,22,27*

2. Use the graph on the next page to answer the following questions. Note that the capital letters are labeling *points*, i.e. (x, y) pairs, while the lower case letters are labeling *coordinate values*. A *line segment* is given by its endpoints, i.e. QR is the notation for 'the line connecting point Q to point R'. You do not need to re-draw the graph in your solutions!

(a) The value of h is represented by the length of which line segment?

(b) The value of $f(a + h)$ is represented by the length of which line segment?



(c) The value of $f(a)$ is represented by the length of which line segment?

(d) What does the length of the line segment RT represent?

(e) The value of $\frac{f(a+h)-f(a)}{h}$ represents what on the graph? (hint: think rise-over-run).

2. Compute the following limits (122A practice):

(a) $\lim_{a\to 0^+} \dfrac{1}{\ln(a)}$

(b) $\lim_{x\to\infty} f(x)$ where $f(x) = \frac{3x^2-3}{x^2-4}$

(c) $\lim_{y\to 0} \dfrac{\sqrt{x+y}-\sqrt{x-y}}{2y}$

3. Suppose that $f(x)$ is continuous and $f(a) = 1$. What is $\lim_{x\to a} f(x)$? You might need to go back to the chapter 1 section on continuity.

4.