Worksheet 2: Intro to Derivatives

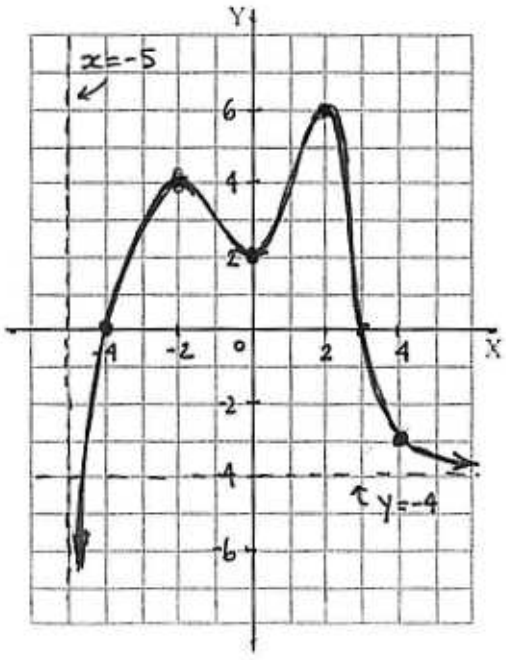
18.01 Fall 2009

Problem 1. Let

$$y = \frac{1}{1-x}$$

Use the definition of the derivative to find the formula for dy/dx

Problem 2. Suppose the following graph from the first worksheet is the graph of the derivative $g'(x)$ of a certain function $y = g(x)$ defined on the interval $x > -5$.



a) What is the formula for the tangent line to $y = g(x)$ at the point (2,3)? How do the graphs of $y = g(x)$ and this tangent line look like relative to each other in a small neighborhood of $x = 2$?

b) What is the behavior of $y = g(x)$ as $x \to -5^+$ and $x \to \infty^-$?

c) At which values of x does $g(x)$ attain maximum and minimum values? Where, if anywhere, is it increasing fastest? decreasing fastest?

d) Suppose you could find out the value of $g(x)$ at any *one* value of x. Which point could you ask for to determine whether $g(x)$ is only negatively-valued for positive values of x?

d*) Looking ahead/discussion: what if you could only find out the value *at* $x = 0$. What are some cases in which you could still answer the above question, using only that value and this relatively sketchy graph?