SB: Foundations of Calculus **HW #1, due 7/2/2013**

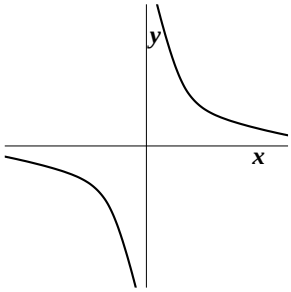
Look at the chapter 1 homework problems (that's section 1.5). Work on any you don't know how to do (!). I'm serious – you should know how to do all of them.

Please **hand in** your answer to problem 4 of 1.5, and also your answers to the problems (Q1 and Q2) below. Show your work.

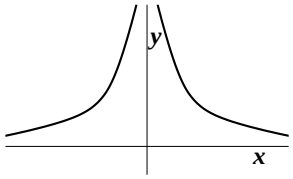
Notation Suppose $a < b$. The *open interval* (a, b) is the collection of all numbers x satisfying both $a < x$ and $x < b$ (the endpoints a and b aren't included). The *closed interval* $[a, b]$ includes its endpoints: all numbers x satisfying both $a \leq x$ and $x \leq b$. There are also half-open intervals $(a, b]$ and $[a, b)$. The notation $(-\infty, b]$ means all numbers x satisfying only $x \leq b$, and $(a, +\infty)$ is all x's with $a < x$ (these are half-infinite intervals).*

Q1. What is the *domain* of the function f defined by $f(x) = \sqrt{4x - 3} + \frac{5}{x - 9}$?

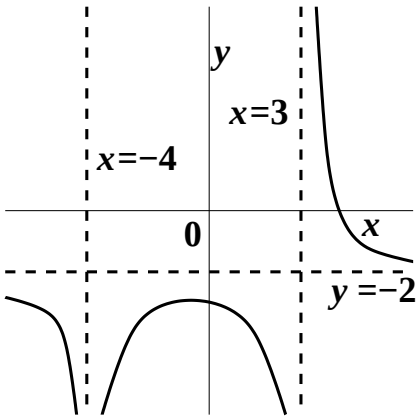
Below is a qualitatively correct graph of $y = \frac{1}{x}$. The graph of $y = x^p$ when p is a **negative odd integer** is similar.



Below is a qualitatively correct graph of $y = \frac{1}{x^2}$. The graph of $y = x^p$ when p is a **negative even integer** is similar.



Q2. Find a formula which when used to define a function will produce a graph which looks qualitatively like the graph shown to the right.**
Explain briefly in complete English sentences how you got your formula and why you believe your graph is correct. (A graphing calculator can check your answer, but I'm more interested in your description of the *process* that you used.)



Hint What does the graph of $-\frac{3}{x + 2}$ look like? What about the graph of $\frac{5}{(x - 3)^2}$? What happens when you add some of these "things"?

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* Mathematicians are proud of being precise. So *politely* don't notice that $(2, 5)$ could mean either an open interval or an ordered pair whose entries are the coordinates for a point in the plane. The context (?) is supposed to make clear which interpretation is meant. Sure.

** There's more than one correct answer to this question!