Homework for Math 151H

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Due Thursday, 7 September 2006

1. Page 111 of our text, problems 15, 17, 19, 21, 23, 25, 27. For these, do not prove the limit, but do give a formula for δ that depends upon ϵ and (possibly) the number where the limit takes place.

2. Let $f(x) = 1/(1+x)$. What is

   (a) $f(f(x))$ (For which x does this make sense?)

   (b) $f\left(\frac{1}{x}\right)$.

   (c) $f(cx)$.

   (d) $f(x+y)$.

   (e) $f(x)+f(y)$.

   (f) For which numbers c is there a number x such that $f(cx) = f(x)$. Hint: There are a lot more than you might think of at first glance.

3. Find the domain of the functions defined by the following formulas.

   (a) $f(x) = \sqrt{1-x^2}$.

   (b) $f(x) = \sqrt{1-\sqrt{1-x^2}}$.

   (c) $f(x) = \frac{1}{x-1} + \frac{1}{x-2}$.

   (d) $f(x) = \sqrt{1-x^2} + \sqrt{x^2-1}$.

   (e) $f(x) = \sqrt{1-x} + \sqrt{x-2}$.

4. (a) For which functions f is there a function g such that $f = g^2$? Hint: You can certainly answer this question if "function" is replaced by "number".

   (b) For which functions f is there a function g such that $f = 1/g$?

For your enjoyment: