Math 104–Spring 2005–Anderson
Problem Set 7
Due Tuesday March 8

1. Let $S = [1, \infty)$, $d(x, y) = |x - y|$ for $x, y \in S$.

   (a) Show that (S, d) is a complete metric space.

   (b) Let $f : S \to S$ be defined by

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

   Show that

   $$d(f(x), f(y)) \leq d(x, y)$$

   for all $x, y \in S$, with strict inequality if $x \neq y$.

   (c) Show that f has no fixed point. Explain why this does not contradict the Contraction Mapping Theorem.

2. Do the following problems from Ross: 13.11, 13.12, 13.14, 13.15, 14.1, 14.3, 14.4, 14.5, 14.6, 14.8, 14.10, 14.12