Implicit in any homework problem is that you must explain why your answer is correct, even if the problem does not ask for a formal proof. You should write in complete sentences with reasonably correct grammar. Math 5345 is not a writing intensive course, but it *is* a 5000-level mathematics course, and at this level you're expected to be able to explain your work in a coherent, organized and logical manner.

If you're losing points on homework because your explanations aren't detailed or "rigorous" enough, come talk to me. Because we're generalizing lots of familiar notions from Euclidean space, many of the problems seem deceptively easy because they're intuitively true in the spaces we're used to. You need to make sure to justify everything, however. You should consider writing up full solutions for me and discussing them in office hours instead of just asking about the proper approach to a given problem; that way I can help you learn exactly what to write (and what can be left out).

This is particularly true with problems dealing with metric spaces; drawing pictures of Euclidean space can be a great way to understand why a particular result is true, but you need to prove it using only the definitions and theorems available from class.

Homework Assignment

Section 1.6: 7, 10.

Section 7.1: 1(c), 9, 11, 12

K1: Let X be a metric space with metric d, $x_0 \in X$ a fixed point or element of X. Define a function from X to the real numbers by

$$f(x) = d(x_0, x).$$

Prove that f is a continuous function.

K2: What is the relationship between the sets $f^{-1}(U \cap V)$ and $f^{-1}(U) \cap f^{-1}(V)$ where $f : X \to Y$ is a function and $U, V \subset Y$?

Extra Credit

Worth up to 5 homework points, but graded strictly. Hand this in on a separate sheet of paper.

EC: Let f, g be two continuous functions from a metric space X to the real numbers. Define

$$h(x) = \max\{f(x), g(x)\},$$

that is, $h(x) = f(x)$ when $f(x) \geq g(x)$, otherwise $g(x)$. Prove that $h(x)$ is continuous.

Jonathan Rogness <rogness@math.umn.edu> October 9, 2007