

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'd like some extra work with some of the concepts, I've included some "practice" problems here. They aren't part of the assignment and **you shouldn't hand them in**, but checking if you can do them is a good idea.

PRACTICE PROBLEMS

- 1.3 #3:** Suppose you're trying to prove that f is continuous at a point $a \in A$. The only problem is that some of the points in X which are within δ of a — in other words, the points in $B_\delta(a) \subset X$ — may not be contained in A . But you could always just look at the points in $B_\delta(a) \cap A$.
- 1.3 #9:** We did a specific example in class where this inequality held.
- 1.4 #1:** Without this, we wouldn't care about homeomorphisms as much.
- 1.5 #2:** Variant of Example 1.49, but the intervals aren't as close.
- 1.5 #6:** Read this, groan, and move on.

HOMEWORK ASSIGNMENT

- Section 1.3 #11:** (So this new distance function replaces Euclidean distance when you're talking about points in X in the definition of continuity.)
- Section 1.4 #9:** One of the few times you'll be asked to find a specific formula for this sort of deformation.
- Section 1.4 #14:** "Geometric Description" means you can draw a few nice pictures and use words to describe the function — no formula necessary.
- Section 1.5 #3:**
- Section 1.5 #8:**
- Section 1.5 #14:** We used this in class to prove Theorem 1.44.
- A:** Let X and Y be path connected sets. Prove or disprove whether the following spaces must always be path connected: $X \cup Y$, $X \cap Y$, $X \times Y$.
- B:** Prove that a torus (see Figure 1.51) is not homeomorphic to a 2-holed torus (see, for example, the last picture in Figure 3.14 on page 99).