Assignment 3; Due Friday, October 14

Read section three on continuous maps and section four on the induced topology. Then do the following problems:

- 2.8a (this should be easy; it is a check to make sure you understand the intuitive idea of closure)
- (graduate students only) 2.8b
- 2.9 c, second part of d, e. Please do these problems immediately after Friday's lecture, since the proofs use the techniques discussed in that lecture. Part e is more difficult, so it is mainly for graduate students. But if an undergraduate finishes everthing else below, he can come back to e.
- (graduate students only) the book defines $\partial A = \overline{A} \cap \overline{X - A}$; this is called the *boundary of* A. Show that this set is equal to the closure of A minus the interior of A.
- 3.2b and (graduate students only) c
- We have been working on the "formal theory" of point set topology. But in the end we want to use this theory to prove interesting things about concrete objects. The remaining exercises are more informal; you can draw pictures and work intuitively. In several cases, a really rigorous proof would require results we don't quite know yet.

  Please do 4.2 as two problems, splitting the set containing all letters and numbers into equivalence classes, and splitting the remaining set of diagrams into equivalence classes. The undergraduates should only do the first of these problems.

  Then do 4.3. Hint: when we say that subsets of R^3 called X and Y are homeomorphic, we do not mean that we can gradually deform X to Y within R^3. We only mean that we can map each point of X to a corresponding point of Y continuously in a one-to-one and onto way. This problem will require some thought, but it is puzzle book stuff rather than abstract mathematics!