Math 441 **Topology** **Autumn 2002**

Assignment #11: Due 12/16/02

Final exam: Wednesday, Decemeber 18, 8:30-10:20 am, in our usual classroom. You may bring two $8\frac{1}{2}'' \times 11''$ one-sided pages (or one sheet written on both sides) of your own handwritten notes. No photocopied or printed material is allowed. You may not share notes with other students.

This assignment is for practice only—not to be handed in.

I. Reading:

- Reread Patty, §§4.1, 4.2 (skip Theorems 4.24–4.29 and Theorems 4.32–4.33).

II. Practice problems:

1. Patty, Exercises 4.1 (p. 131) #1, 3, 5, 9.
2. Patty, Exercises 4.2 (pp. 137–140) #5.
3. Define a topology on the set $\mathbb{Z}$ of integers by declaring a set $A \subset \mathbb{Z}$ to be open if and only if $n \in A$ implies $-n \in A$. Show that $\mathbb{Z}$ with this topology is second countable and limit point compact but not compact.
4. Let C be the surface of the unit cube in $\mathbb{R}^3$:

$$C = \{(x, y, z) : \max(|x|, |y|, |z|) = 1\}.$$

   Define a map $f\colon C \to S^3$ by $f(p) = p/\|p\|$. Show that f is a homeomorphism. [Hint: Use the closed map lemma.]