Homework #22

Math 460, Topology. Spring 2001

1. Show that if X and Y are homeomorphic, then X is simply connected iff Y is simply connected.

Extra Credit Problems

2. In Example 4 of Section 13, prove that $\alpha \cdot \beta$ and $\beta \cdot \alpha$ are homotopic as loops in X.
3. Prove that for any topological space X, $\pi_1(X)$ is indeed a group, by verifying the four bulleted conditions listed at the end of Section 13.
4. (a) Can the floor of a room be so uneven that no matter where you put a four-legged table (or chair) on it, it will always wobble? Assume the floor's surface is continuous and the tips of the legs form a rectangle.
   (b) What if the legs' tips form a parallelogram that's not a rectangle? What if they form a regular pentagon or hexagon? How about a regular n-gon? How about an irregular n-gon?