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

Assignment #10: Due 12/9/02

I. Reading:

- Reread Patty, §3.1 (skip Theorems 3.14–3.17, but do read Example 5).
- Read Patty, §3.2, pages 112–113 (except the definitions at the bottom of page 113).
- Read Patty, §§4.1, 4.2.

II. Practice problems:

1. Patty, Exercises 3.1 (pp. 110–112) #1, 2, 12, 16, 20,
2. Patty, Exercises 3.2 (pp. 118–119) #1,

III. Required problems:

1. Patty, Exercises 3.1 (pp. 110–112) #5.
2. Patty, Exercises 3.1 (pp. 110–112) #6.
3. Patty, Exercises 3.1 (pp. 110–112) #7.
4. Patty, Exercises 3.1 (pp. 110–112) #9.
5. Patty, Exercises 3.1 (pp. 110–112) #11.
6. Patty, Exercises 3.1 (pp. 110–112) #15.
7. Patty, Exercises 3.1 (pp. 110–112) #18. [Remark: This result implies, in particular, that at any moment there are two diametrically opposite points on the equator that have exactly the same temperature.]
8. Patty, Exercises 3.1 (pp. 110–112) #21.
9. Patty, Exercises 3.2 (pp. 118–119) #10.
10. If U is an open subset of $\mathbb{R}^n$, show that U is connected if and only if it is pathwise connected. [Hint: If U is connected and nonempty, let $x_0 \in U$ be arbitrary, and let V be the set of points $y \in U$ such that there exists a path in U from x_0 to y. Show that V is both open and closed in U.]