Read Sections 1-7, 9, 10 in Chapter 1 of Munkres, and read Section 1.1 of Patty. The notion of equivalence relation in Section 3 will not be used until we discuss quotient spaces; I will discuss it in class at that time. We will not be discussing axiomatic characterizations of the integers or real numbers in this course — as in Section 4 — however, you will need a working knowledge of properties of these numbers as well as an understanding of completeness and induction. I may also at times use the Axiom of Choice, mostly without comment. At least informally, this axiom is eminently believable, so I wouldn’t worry too much about trying to understand the more formal treatment in Section 9 of Munkres. In Section 10, you should know the statement of the Well-ordering Theorem, but the following discussion of the set $S_0$ is optional. Munkres uses this set in some examples, but you will not be responsible for these.

Now do the following exercises. (Textbook exercises all refer to the Munkres text.)

§2: 4a–e; 5,
§7: 5a,d,f; 6

Extra Exercise 1: Consider the sets $\mathbb{R} \times [0,1]$ and $[0,1] \times \mathbb{R}$ with the dictionary order. Determine whether each one has the least upper bound property. You must, of course, justify your answers.

Extra Exercise 2: Prove that if $X$ is uncountable and $A$ is countable, then $X$ has the same cardinality as $X - A$. (Hint: Find a countably infinite subset $B$ in $X - A$ and use the fact that there is a bijection from $B \cup A$ to $B$.)

This assignment is due Friday, October 9.