Math 41 Spring 2000

EXAM 1
5 problems, 10 points each

Instructions.
1. “Show enough work to justify your answers.”
2. The solutions should not make references to computations with a calculator.
3. Do the problems in the given order.
4. Start each problem on a new page.
5. Keep this sheet.

Problems.
1. Suppose \( X \) is a compact metric space. Show that every sequence in \( X \) has a convergent subsequence.

2. State and prove the Contraction Principle.

3. Show that in a metric space, \( \bar{S} \) is a disjoint union of \( \text{int}S \) and \( \partial S \).

4. Show that every metric space is a \( T_4 \)-space.

5. Find all the topologies on the set of 4 elements that make it connected.