Homework 5: 21-355–Principles of Real Analysis I

DUE: Friday, November 4, 2016

Name: _____

Instructions: Complete the following problems, clearly labeling the problems. Staple this sheet, with your name filled in, to the top of your work. Failure to attach this sheet will result in a five-point deduction in the grade. The assignment will be graded out of one hundred points.

1. Exercise 3.3.4
2. Exercise 3.3.6
3. Exercise 3.3.8
4. Exercise 3.4.7
5. Exercise 3.4.9
6. Exercise 4.2.2
7. Exercise 4.2.6
8. Exercise 4.3.4
9. Let $E \subseteq \mathbb{R}$.
   (a) Show that E is connected if and only if there are no non-empty sets $U_1, U_2 \subseteq E$ open in E such that $E = U_1 \cup U_2$ and $U_1 \cap U_2 = \emptyset$.
   (b) Show that the previous part remains true if open is replaced with closed.
10. Let I_1 and I_2 be open intervals such that $I_1 \cup I_2$ is itself an open interval. Show that $I_1 \cap I_2 \neq \emptyset$.