Math 140a Fall 2015 Homework 8

Due Friday November 20 by 5pm in HW box in basement of AP&M

Reading

Read Chapter 4. Note that no homework will be due on November 27 (Thanksgiving Holiday)

Assigned problems from the text (write up and hand in):

Chapter 4: #2, 3, 4, 7, 11, 12, 18, 20

Remarks: In #11, don't do the part that asks you to use the result to give another proof of Exercise 13. In #18, just prove that the function is continuous at every irrational point and not continuous at each rational point. We won't discuss "simple" discontinuities yet. For the second part of #4, first do problem A below.

Additional problem (write up and hand in)

A. Let $f : X \to Y$ and $g : X \to Y$ be continuous functions where X and Y are metric spaces. Let $W = \{x \in X | f(x) = g(x)\}$. Prove that W is a closed subset of X.

Optional problem (handing in not required):

B. Chapter 4: #6

Remark: The problem is not so clearly stated. Assume that $f : E \to Y$ for some metric space Y. Then the graph of f is the subset $G = \{(x, f(x)) | x \in E\}$ of the Cartesian product $E \times Y$. The Cartesian product $E \times Y$ is again a metric space, where $d((e_1, y_1), (e_2, y_2)) = [d(e_1, e_2)^2 + d(y_1, y_2)^2]^{1/2}$, so the subset G is a metric space. Now the problem is to prove that assuming that E is compact, then f is continuous if and only if G is compact.