Math 112 Homework 6

Due Tuesday April 2, 2019, on Canvas.

You are encouraged to discuss the homework problems with other students. However, what you hand in should reflect your own understanding of the material. You are NOT allowed to copy solutions from other students or other sources. *No late homeworks will be accepted.*

Please pay attention to the clarity and precision of your answers. Your solutions to the problems should always consist of carefully written mathematical arguments.

Material covered: Rudin pages 83–98.

Problem 1. (4 points) Rudin Chapter 4 Problem 2.

Hint: Recall the following corollary of Theorem 3.2(d): $p \in \bar{E}$ if and only if there exists a sequence $\{p_n\}$ of elements of E such that $p_n \to p$.

Problem 2. (3 points) Rudin Chapter 4 Problem 3. Don't use Theorem 4.8 or its corollary.

Hint: You can either argue directly or use Problem 1.

Problem 3. (3 points) Rudin Chapter 4 Problem 4.

Hint: The first question is easily answered using Problem 1.

Problem 4. (6 points) Rudin Chapter 4 Problem 8. (Note: E is not necessarily an interval!)

Problem 5. (3 points) Rudin Chapter 4 Problem 14.

Hint: Consider the function $g(x) = x - f(x)$.

Problem 6. (5 points) Rudin Chapter 4 Problem 18.

Hint: Show that $\forall x \in \mathbb{R}$, $f(x+) = f(x-) = 0$, by observing that the set of points $y \in [x-1, x+1]$ where $f(y) \geq \frac{1}{n}$ is finite.