Exercises for Week 9

The work handed in should be entirely your own. You can consult Gamelin and/or the class notes but nothing else. To receive full credit, justify your answer in a clear and logical way. Due Apr. 10.

Reading. Read Chapter V of the textbook carefully (better before you attempt the homework problems).

1. (a) Prove the following theorem rigorously using ϵ-δ language.

   Theorem 1. *Let $\{f_j\}$ be a sequence of complex-valued functions defined on a subset E of the complex plane. If each f_j is continuous on E, and the sequence of functions converge uniformly to f on E, then f is also continuous on E.*

   (b) Find an example of a sequence of functions on the unit interval $(-1, 1] \subset \mathbb{R}$ that converges pointwise, but the limit function is not continuous.

2. Section V.3. Exercises 3, 4.

3. Section V.4. Exercises 1 (b), (d), (f), 6, 11, 13.

4. Section V.5. Exercises 1 (a), (c), 4.