Math 401/501
Assignment 8, due Thursday, October 24

Problems from Taylor:
§3.1, p.64: 2, 4, 11, 12
§3.2, p.68: 2, 4

Also, hand in the following extra problem:

Using the definition of continuity, prove that the function \( f: \mathbb{R} \to \mathbb{R} \) given by \( f(x) = x^2 - 3x + 5 \) is continuous at every point \( a \in \mathbb{R} \).

Notes:

- For problem #4 in 3.1, prove that the function is continuous directly using the definition of continuity, that is, using \( \epsilon \)'s and \( \delta \)'s. You will get additional practice on using the definition with the extra problem.

- However, for problem #2 in 3.1, you may apply theorems to prove the continuity of the function (such as Theorem 3.1.9).

- For #11 in 3.1, consider using the sequential criteria of continuity in Theorem 3.1.6, that is, show there exists a sequence \( \{x_n\}_{n=1}^\infty \) converging to zero, such that its image under \( f \), \( \{f(x_n)\}_{n=1}^\infty \) does not converge to \( f(0) \).

- For both #11, #12 in 3.1, you may assume the sine function has all the usual properties, including that \(-1 \leq \sin \theta \leq 1\) for every \( \theta \in \mathbb{R} \).

Not collected:
§3.1, p.64: 3, 5, 8, 9
§3.2, p.68: 1, 5

Reading: 3.1, 3.2, 3.3