Math 299  Fall 2014  Homework 8

Due:  Thursday, October 16.

Directions:

- Print out this piece of paper and use it as a cover sheet. Write your name in the upper right hand corner.
- Your homework should be stapled and each problem should occur in order.
- Do not hand in scratch work.
- Homework is due at the start of class.

1. Problems

2. Let \( \{a_0, a_1, \ldots, a_n\} \) be \( n + 1 \) different integers. Show that there exists \( i, j \in \{0, 1, \ldots, n\} \) with \( i \neq j \), with that \( a_i \equiv a_j \mod n \).
3. Let \( r \in \mathbb{Q} \). Prove that if \( r \neq 0 \), then \( r/\sqrt{2} \) is irrational.
4. Give three different proofs including a direct, a proof of the contrapositive, and a proof by contradiction for the following statement: “If \( n \) is an odd integer, then \( 7n - 5 \) is even.”
5. Textbook exercises: 6.1, 6.3, 6.5.
6. More textbook exercises from Chap. 6 will come on your next homework!