

Math 255 - Spring 2017
Homework 8

This homework is due on Monday, April 3 by 5pm. Please support every assertion that you make with either a precise reference from the textbook (theorem number or page) or provide a proof.

1. Let $n \geq 2$. Show that

$$\prod_{a \in (\mathbb{Z}/n\mathbb{Z})^\times} a \equiv \pm 1 \pmod{n}.$$

(In other words this product will always be either 1 or -1 .)

Hint: This is similar to the proof of Wilson's Theorem, except that it is now false that $x^2 \equiv 1 \pmod{n}$ has exactly two solutions.

2. For any integer a , show that a and a^{4n+1} have the same last digit.
3. Prove that if a has order $n - 1$ modulo n , then n is a prime.