Collected Homework Week 15

MATH 278: Number Theory
Due: May 3, 2011 at 4:00pm

Name (Print): _____
Extension: May 4, 2011 at 4:00pm

1. **The Euler-ϕ Function**

   (a) Using the results from Jena and Xiaochuang's presentation, determine $\phi(77)$.

   (b) Use the information from (a) to evaluate $2^{100000} \pmod{77}$.

2. **Wilson's Theorem**

   (a) Find a k such that $15! \equiv k \pmod{17}$.

   (b) Find a k such that $2(26)! \equiv k \pmod{29}$.

   (c) Show that $18! \equiv -1 \pmod{437}$.

3. Prove that every odd prime divisor of $n^2 + 1$ is of the form $4k + 1$. (Hint: Use order to help you.)