Homework Assignment HW3  Due Friday, February 20, 2015

Instructions: Do not copy work from other sources. Check your answers whenever it is reasonable to do so.

1. Find the unique values of $x, y \in \mathbb{F}_{103}$ satisfying

\[ 68x + 19y = 33 \quad \text{and} \quad 17x + 91y = 20. \]

Show work by hand, and check your answers. Calculators may be used for simple arithmetic; but any programmable features (calculator or computer) should not be used, other than for the purpose of checking your work.

2. Using your answer in #1, find all pairs of integers $(x, y)$ such that

\[ 68x + 19y \equiv 33 \quad \text{and} \quad 17x + 91y \equiv 20 \pmod{103}. \]

3. Using Fermat’s Little Theorem, give a short proof that $2^{64} + 1$ is not prime. You may use a calculator and/or computer, but no other sources.