

**WORKSHEET #1 – MATH 5405
SPRING 2016**

DUE: TUESDAY, 1/19/2016

Only one worksheet is required per group.

1. Solve the following equations by computing the inverse of 7.

$$7x \equiv 1 \pmod{13}$$

$$7x \equiv 5 \pmod{18}$$

$$7x \equiv 11 \pmod{23}$$

2. Solve the system of congruences (hint, there are 3 congruences, first solve the first two and turn it into a new congruence)

$$x \equiv 5 \pmod{9}$$

$$x \equiv 3 \pmod{8}$$

$$x \equiv 6 \pmod{7}$$

Suppose p is prime. Recall a number $0 \leq a \leq p - 1$ is called a *primitive root modulo p* if the multiplicative order of a is equal to $p - 1$.

3. Find all the primitive roots of among numbers modulo 7, 11 and 12.

4. Compute $3^{121} + 2^{302}$ modulo 31.