

## CISC 1100: HW 5

NAME:

1) Find all of the inverses in the following  $(\text{mod } n)$ :

a)  $(\text{mod } 11)$

b)  $(\text{mod } 13)$

c)  $(\text{mod } 12)$

d)  $(\text{mod } 8)$

e) What do you notice about the inverses  $(\text{mod } 12), (\text{mod } 8)$ ? Guessing, what do you think this means about the elements with an inverse  $(\text{mod } 12), (\text{mod } 8)$ ?

2) Solve the following equations, if possible. If there are multiple solutions, list them. If not possible, explain.

a)  $4x \equiv 5(\text{mod } 7)$

b)  $7x \equiv 9(\text{mod } 11)$

c)  $2x \equiv 8(\text{mod } 13)$

d)  $4x \equiv 5(\text{mod } 12)$

e)  $4x \equiv 4(\text{mod } 8)$

3) At a hotel, there are three international clocks behind the concierge. If one is GMT (+0 hours), PST (-8 hours) and ET (-5 hours). If it is 6:04pm in New York City, what hour is the hour hand on the GMT clock and on the PST clock?

4) Solve this system of equations:

$$2x \equiv 5(\text{mod } 9)$$

$$4x \equiv 5(\text{mod } 7)$$

Hint:  $9(-3) - 7(-4) = 1$

5) There are two gears that work on one crank. The first gear has seven spokes and moves 4 spokes every crank. The second gear has nine spokes and moves 2 every crank. How many cranks will it take for both gears to be on the 5th spoke?