Math 105: Modular Arithmetic Practice Exercises

1. For each of the following computations modulo n, write the unique answer, r, such that $0 \leq r \leq n-1$.

a) $5 + 6 \equiv$ ______ $\pmod 8$

b) $3 + 4 \equiv$ ______ $\pmod 7$

c) $3 - 5 \equiv$ ______ $\pmod 8$

d) $1 - 5 \equiv$ ______ $\pmod 7$

e) $4 \cdot 5 \equiv$ ______ $\pmod 6$

f) $4 \cdot 5 \equiv$ ______ $\pmod 5$

2. Solve each of the following equations for x, if possible. This means to find one more or values of "x" in the range from 0 to n-1 (where n is the "mod" for that equation) for which the equation is true.

If you're not sure how to approach these, you can start with a "trial-and-error" approach… that is, see if x=0 works, then try x=1, then x=2, and so on, up to x=n-1.

(Hint: one of these has multiple solutions, and two of these have no solution!)

a) $x - 4 = 5\ (mod\ 10)$

b) $x - 4 = 5\ (mod\ 7)$

c) $4x = 5\ (mod\ 10)$

d) $4x = 5\ (mod\ 7)$

e) $3x = 7(mod\ 12)$

f) $3x = 6(mod\ 12)$