

**Homework 4**

due Thursday, June 25, at 12:30 pm

Hand in:

From the text:

Section §1.4 #27, 28

27. Prove that if  $p$  is a prime number, then  $(p-1)! \equiv -1 \pmod{p}$ .
28. Prove that if  $\gcd(m, n) = 1$ , then  $n^{\varphi(m)} + m^{\varphi(n)} \equiv 1 \pmod{mn}$ .

From the Study Guide: pages 15,15 §1.4 #44a,b,c; 46

44. Make multiplication tables for the following sets.

- (a)  $\mathbf{Z}_9^\times$
- (b)  $\mathbf{Z}_{10}^\times$
- (c)  $\mathbf{Z}_{12}^\times$

46. Find the multiplicative orders of the following elements.

- (a)  $[5]$  and  $[7]$  in  $\mathbf{Z}_{16}^\times$ .
- (b)  $[5]$  and  $[7]$  in  $\mathbf{Z}_{17}^\times$ .
- (c)  $[5]$  and  $[7]$  in  $\mathbf{Z}_{18}^\times$ .