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) \( \mathbb{Z}_9 \times \mathbb{Z}_9 \)
   (b) \( \mathbb{Z}_{10} \times \mathbb{Z}_{10} \)
   (c) \( \mathbb{Z}_{12} \times \mathbb{Z}_{12} \)

46. Find the multiplicative orders of the following elements.
   (a) \([5]\) and \([7]\) in \( \mathbb{Z}_{16} \).
   (b) \([5]\) and \([7]\) in \( \mathbb{Z}_{17} \).
   (c) \([5]\) and \([7]\) in \( \mathbb{Z}_{18} \).