## MATH 113: DISCRETE STRUCTURES HOMEWORK DUE WEDNESDAY WEEK 14

As usual, show your work for the following problems.

*Problem* 1. Use Sunzi's Theorem to efficiently compute the congruence class of  $17^2$  modulo 35 as follows: First compute  $17^2 \pmod{7}$  and  $17^2 \pmod{5}$ . Next, find the numbers in  $\{0, 1, \ldots, 34\}$  that equal  $17^2 \pmod{7}$ . Of these, which are equal to  $17^2 \pmod{5}$ ?

*Problem 2.* Describe *all* integer solutions to the system of congruences:

$$x = 1 \pmod{3}$$
  
 $x = 2 \pmod{4}$   
 $x = 3 \pmod{5}.$ 

*Problem* 3. Find integers  $x, y \in \{0, 1, 2, ..., 7\}$  satisfying

 $x + 5y = 7 \pmod{8}$  $3x + y = 1 \pmod{8}.$