

## HOMWORK ASSIGNMENT NO. 8

DATE: FEBRUARY 23, 2010 DUE: MARCH 9, 2010

Read section 8.5 in the book. Know the definitions of *divides* and  $r \equiv s \pmod{a}$ .

- (1) Prove by providing an argument or disprove by finding a counterexample to the following statements.  $a, b$  are positive integers and  $r, s$  are integers.
- (a) if  $r \equiv s \pmod{a}$ , then  $s \equiv r \pmod{a}$ .
  - (b) if  $r \equiv s \pmod{a}$ , then  $r \equiv s \pmod{ab}$ .
  - (c) if  $r \equiv s \pmod{ab}$ , then  $r \equiv s \pmod{a}$ .
  - (d) if  $r \equiv s \pmod{a}$ , then  $kr \equiv ks \pmod{a}$ .
  - (e) if  $kr \equiv ks \pmod{a}$ , then  $r \equiv s \pmod{a}$ .
  - (f) if  $rs + ab = 1$  then  $rs \equiv 1 \pmod{a}$ .
  - (g) there exists an  $x \in \{0, 1, 2, \dots, a - 1\}$  such that  $s \equiv x \pmod{a}$ .
  - (h) if  $s \equiv 0 \pmod{a}$  then  $a$  divides  $s$ .
  - (i) if  $s \equiv 0 \pmod{a}$  then  $s$  divides  $a$ .
  - (j) if  $b \equiv 0 \pmod{a}$  and  $a \equiv 0 \pmod{b}$ , then  $a = b$ .