

Instructions

- Answer each question completely; justify your answers.
 - This assignment is due at 17:00 on Thursday November 9th in Assignment Box #35.
1. Suppose $a, b, c \in \mathbb{Z}$ such that a and b are relatively prime, $a \mid c$ and $b \mid c$. Prove that $ab \mid c$.
 2. Prove that if $a \in 2\mathbb{N} - 1$ then $\gcd(a, a + 2) = 1$.
 3. Reduce a modulo n
 - (a) $a = 456723, n = 19$
 - (b) $a = (9675)(5679), n = 41$
 - (c) $a = (902)^{68}(671)^{200}, n = 12$
 - (d) $a = (-8766)^{5765}(-6789)^{3231}, n = 7$
 4. Solve the following congruences:
 - (a) $3x \equiv 19 \pmod{44}$
 - (b) $7x \equiv 18 \pmod{430}$
 - (c) $8x \equiv 9 \pmod{20}$
 - (d) $8x \equiv 16 \pmod{20}$
 - (e) $6x \equiv 0 \pmod{12}$
 5. Solve the following systems of congruences:
 - (a) $5x - 2y \equiv 0 \pmod{11}$ and $2x + y \equiv 3 \pmod{11}$
 - (b) $8x + 4y \equiv 2 \pmod{22}$ and $x - 3y \equiv 7 \pmod{22}$
 - (c) $6x - 7y \equiv 8 \pmod{33}$ and $3x + 2y \equiv 1 \pmod{33}$
 6. Section 4.4, Exercise 14, parts (b), (c) and (d).
 7. Solve the following system of congruences: $x \equiv 88 \pmod{99}$
 $x \equiv 77 \pmod{100}$
 8. Solve the following system of congruences: $x \equiv 7 \pmod{11}$
 $x \equiv 5 \pmod{18}$
 $x \equiv 9 \pmod{37}$
 9. Solve the following system of congruences: $x \equiv 2 \pmod{4}$
 $x \equiv 3 \pmod{9}$
 $x \equiv 11 \pmod{25}$
 $x \equiv 8 \pmod{49}$