1. Prove or disprove that if gcd(a, b) = d, then there exist ***unique*** integers x, y such that $d = a \cdot x + b \cdot y$
2. Prove that if gcd(a, n) = d > 1 then the multiplicative inverse of a modulo n does not exist.
3. We know that if gcd(a, b) = d, then there exist x, y such that $d = a \cdot x + b \cdot y$, prove that gcd(x, y) = 1
4. (Stinson 5.7) Solve the following system of congruences:

$$13x \equiv 4 \pmod{99}$$
$$15x \equiv 56 \pmod{101}$$