1. Use Euclidean algorithm to obtain integers x and y satisfying the flowing
   a. $\gcd(24,\ 138) = 24x + 138y$.
   b. $\gcd(119,\ 272) = 119x + 272y$.
2. Assuming that $\gcd(a, b) = 1$, prove the following
   a. $\gcd(a + b, a - b) = 1\ or\ 2$.
3. In ABC university each student is assigned an enrolment number. The last three digits of the enrolment number of a male student born in the month m on date b is 71m+2b+1 and that of female student is 71m+2b. find the date of birth and sex corresponding to the numbers.
   a. 480
   b. 911
   c. 716
   d. 717
   e. 172
4. Solve the following congruences if the solution exists. If no solution exists explain why
   a. $3x \equiv 1(mod\ 7)$
   b. $8x \equiv 4(mod\ 6)$
   c. $8x \equiv 5(mod\ 11)$
5. Solve each of the following sets of simultaneous congruences
   a. $x \equiv 1(mod\ 3),\ \ x \equiv 2(mod\ 5),\ \ x \equiv 3(mod\ 7)$
   b. $x \equiv 5(mod\ 6),\ \ x \equiv 4(mod\ 11),\ \ x \equiv 3(mod\ 17)$
6. Solve the linear congruence relation $17x \equiv 3(mod\ 210)$ by solving the system
   (Hint: $210 = 2 \times 3 \times 5 \times 7)\ by\ solving\ the\ system$
   $17x \equiv 3(mod\ 2),\ \ 17x \equiv 3(mod\ 3),\ \ 17x \equiv 3(mod\ 5),\ \ 17x \equiv 3(mod\ 7)$.