CSL 101- Discrete Mathematics
Indian Institute of Technology Bhilai
Tutorial Sheet 7

1. Express the greatest common divisor of each of these pairs of integers as a linear combination of these integers.
   (a) $10, 11$
   (b) $21, 44$
   (c) $36, 48$
   (d) $34, 55$
   (e) $117, 213$
   (f) $0, 223$
   (g) $123, 2347$
   (h) $3454, 4666$
   (i) $9999, 11111$
2. Show that 15 is an inverse of 7 modulo 26.
3. Show that 937 is an inverse of 13 modulo 2436.
4. Show that an inverse of a modulo m does not exist if $\gcd(a, m) > 1$.
5. Show that the positive integers less than 11, except 1 and 10, can be split into pairs of integers such that each pair consists of integers that are inverses of each other modulo 11.
6. Encrypt the message ATTACK using the RSA system with $n = 43 \times 59$ and $e = 13$, translating each letter into integers and grouping together pairs of integers.
7. What is the original message encrypted using the RSA system with $n = 43 \cdot 59$ and $e = 13$ if the encrypted message is 0667 1947 0671?