

Tutorial

Day-1

Practice problem:

1. Find the result of $3^{16} \pmod{4}$
2. What is the last digit of 17^{17}
3. Find the last three digits of 2^{40}
4. Find the product of $a = (110)_2$ and $b = (101)_2$
5. Convert binary expansion of each of these integers to a decimal expansion:
 - a. 321
 - b. 1023
 - c. 100632
6. Convert the octal expansion of each of these integers to a binary expansion:
 - a. $(572)_8$
 - b. $(1604)_8$
 - c. $(423)_8$
 - d. $(2417)_8$
7. Find the value of $7^{644} \pmod{645}$
8. Find the multiplicative inverses of the following:
 - a. $3 \pmod{26}$
 - b. 11 in \mathbb{Z}_{26}

9. Find gcd of (161,28) using extended Euclidean algorithm (hints: $s_1 = 1$, $s_2 = 0$ and $t_1 = 0$, $t_2 = 1$). Also find the value of s and t
10. Find gcd of (1398, 324) using extended Euclidean algorithm (hints: $s_1 = 1$, $s_2 = 0$ and $t_1 = 0$, $t_2 = 1$)
11. Find a particular and general solutions to the equations $5x + 22y = 18$
12. Find a solution to the Diophantine equation $47x + 30y = 1$
13. Find a solution to the linear Diophantine equation $195x + 42y = 12$
14. Solve $x, x \equiv 2 \pmod{3}$, $x \equiv 2 \pmod{4}$, $x \equiv 1 \pmod{5}$ by using Chinese remainder theorem
15. Find the value of $x, x \equiv 1 \pmod{3}$, $x \equiv 1 \pmod{4}$, $x \equiv 1 \pmod{5}$, $x \equiv 0 \pmod{7}$ chinese remainder theorem

Thank you