NATIONAL UNIVERSITY
of Computer & Emerging Sciences, Lahore

CS 1005 – Discrete Structures BCS-3E (Fall 2024), Instructor: Dr. Imran Nadeem

ASSIGNMENT- 2, Maximum Marks: 10 (1+1+1+1+1+1+2+2)

NOTE: Assigned Date: 21-10-2024 and Submission Date: 28-10-2024

Q. No. 1 Use the extended Euclidean algorithm to express gcd(252, 356) as a linear combination of 252 and 356.

Q. No. 2 Show that 937 is an inverse of 13 modulo 2436.

Q. No. 3 Solve the congruence $200x \equiv 13 \pmod{1001}$.

Q. No. 4 Prove that if *n* is a positive integer, then 133 divides $11^{n+1} + 12^{2n-1}$.

Q. No. 5 Prove that $3^n < n!$ if *n* is an integer greater than 6.

Q. No. 6 Use strong induction to prove that $\sqrt{2}$ is irrational. [*Hint:* Let *P*(*n*) be the statement that $\sqrt{2} \neq n/b$ for any positive integer b.]

Q. No. 7 How many positive integers between 100 and 999 inclusive

(a) are divisible by 3 or 4

(b) are divisible by 3 and 4.

Q. No. 8 A drawer contains a dozen brown socks and a dozen black socks, all unmatched. A man takes socks out at random in the dark.

a) How many socks must he take out to be sure that he has at least two socks of the same color?

b) How many socks must he take out to be sure that he has at least two black socks?