National University of Computer and Emerging Sciences, Lahore Campus

	Course:	**Theory of Programming Languages**	**Course Code:**	**CS507**
	Program:	**MS**	**Semester:**	**Fall 2020**
	Duration:	**40 Minutes**	**Total Marks:**	**25**
	Paper Date:	**21 September 2020**	**Weight**	
	Section:		**Page(s):**	**3**
	Exam:	**Quiz 1**		

Instruction/Notes: Attempt all questions on the question paper.

Name: _____ Roll Number: _____

1. [5] Find DFA for the following language on Σ = {a, b}. (Try and do this in as few states as possible)
   a) L={w: (nb(w)- na(w)) mod 3 > 0} //to be done by roll numbers ending with even number
   b) L={w: (na(w)- nb(w)) mod 4 > 0} //to be done by roll numbers ending with odd number

Note: a similar question is given in the assignment. If answer to this question is incorrect, marks will not be given in the assignment question as well.

2. [10]
   Consider a coin flipping game in which you will be given a chance to flip the coin thrice, you will only win the game if the results of all your flips are same.
   Create a complete state diagram of deterministic Finite Automata for this game.

3. [10]

Convert the following NFA-null (over the alphabet Σ = {0, 1}) to a DFA using the **subset construction method**. Label each state of the DFA appropriately to indicate which states of the NFA it corresponds to. Show complete working.