Quiz 4
CS 203: Discrete Structures

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INSTRUCTIONS: Answer all questions. You have to give a clear answers with proper justification. Submit one single pdf file containing solutions to all problems. Take clear pictures and convert to a single pdf file. Name your file as *rollno.pdf*. For example, 200010018.*pdf*. Late submissions will not be graded. Do not use web resources or answers from your peers to obtain solutions. If anyone is involved in malpractice of any sort, then suitable disciplinary action will be taken. If required, there would be a viva to selected set of students. The exam is from 11.45 am to 12.45 pm. You can submit your answer up to 1.00 pm.

1. $17! \equiv 1 \pmod{19}$. Is the statement true or false? Justify. (1)

2. Let G be a group. Consider the elements a, b, c in G . If $ba = ca$ then $b = c$, and if $ab = ac$ then $b = c$. Prove or disprove this statement with justification. (1)

3. State Bezout's identity and give proof outline to prove the same. (1)

4. Let H be a normal subgroup of a group G, and K be any subgroup of G. Then $HK = \{hk | h \in H, k \in K\}$ is a: (i) Normal subgroup of G. (ii) Subgroup of G.Justify your answer. (2).

5. Find out the remainder, if 2^{1000} is divided by 13? (1)

6. If G is a group over the operation '*'. H_1 and H_2 are two subgroups of G such that $H_1 \not\subset H_2$ and $H_2 \not\subset H_1$. Then prove that $H_1 \cup H_2$ is not a subgroup in G. (2)

7. Give an example of a finite cyclic group G with order 11. List all its generators. If any element is not generator, then justify. (2)