Department of Computer Science and Software Engineering
Comp 232 Mathematics for Computer Science Fall 2020
Assignment 3 Due : November 14, 2020

1. a) Use set identities to prove that $A \cup (B - A) = A \cup B$

b) Use set identities to prove that $A \cap (B - A) = \phi$

c) Use set identities to prove that $\overline{A \cup (B \cap C)} = (\bar{C} \cup \bar{B}) \cap \bar{A}$

2. a) Prove or give a counterexample for the statement that if A and B are sets, then $\mathcal{P}(A \cap B) = \mathcal{P}(A) \cap \mathcal{P}(B)$.

b) Let $A = \{0, 1, \phi\}$. *List the elements of* $\mathcal{P}(A)$.

3. Give an example of a function $f : Z \rightarrow Z^+$ that is

a) one to one, but not onto

b) onto, but not one to one

4. Give a proof by cases that $\lfloor 4x \rfloor = \lfloor x \rfloor + \lfloor x + ¼ \rfloor + \lfloor x + ½ \rfloor + \lfloor x + ¾ \rfloor$

5. Give an example of two uncountable sets A and B such that A – B is

a) finite

b) countably infinite

c) uncountable

6. Use the Euclidean algorithm to find the following :

a) gcd(985, 408)

b) gcd(7953, 5822)

c) gcd(38785, 16768)

7. a) Find the value of 10! **mod** 11

b) Find the value of 12! **mod** 13

c) Make a conjecture about the value of (p-1)! **mod** p, where p is a prime.

8. Prove that for any positive integer n, gcd(7n+2, 4n+1) = 1

9. Show that if a, b, c, and d are integers and $a \neq 0$, that if a | c and b | d then ab | cd.

10. Prove that if n is an odd positive integer then $n^2 \equiv 1 \ (mod\ 8)$.