



ASSIGNMENT 1

Chapter 1 SETS

Abstract

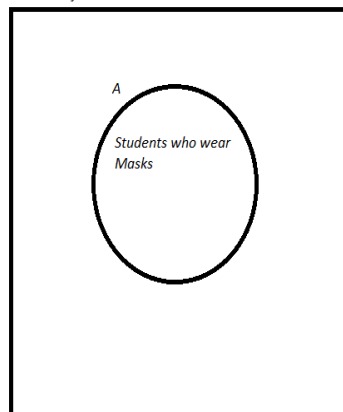
Please keep solving problems as soon as relevant portion is covered in class and submit all solutions together by due-date. You may submit typed or hand-written solutions. If it is hand-written, please make sure your photo-copy via mobile camera is clear and dark for all pages. Any copies which are not clear will not be graded.

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[Email address]

- 1) $A = \{1,2,3\}$, $B = \{3,1,2\}$, $C = \{3,2,2,1\}$
Are these sets equal? (Is $A=B=C$). Explain your answer.
- 2) $A = \{10,11,12,13\}$
 $B = \{12,13,14\}$
List all the partitions (subsets) of $A \cap B$.
- 3) Show relationship of N, Z, Q, R using example and Venn Diagram.
- 4) a) Show an example of empty set.
b) Show an example of disjoint set.
c) What is a universal set?
d) Show an example of subset? Show with an example what is the difference between proper subset and subset?
e) When do you say two sets are equal?
- 5) $A = \{1,3,5,7\}$ $B = \{1,2,3,4\}$ $C = \{3,4,6,7,9\}$
Draw Venn diagrams of:
 - a) $A \cap B \cap C$
 - b) $(B \cap C) - A$
 - c) $A - (B \cup C)$
 - d) $(A \cap B)^c \cup C$
 - e) $A \cup (B \cap C)^c$
- 6) Multiple choice question:
Choose a correct option. Give explanation for your answer.

Total no of Sac State Students



What is A^c ?

- a) Students who do not go to Sac State.
- b) Students who don't wear masks.
- c) Both of above
- d) None of the above.

7) $X = \{x/x \text{ is an even number and } x > 0 \text{ and } x < 5\}$

$Y = \{x/x \text{ is odd number and } x > 0 \text{ and } x < 5\}$

Prove $X * Y \neq Y * X$, Where $*$ denotes the product operator. (The proof is only for X and Y).

8) $A = \{7, 8, 9\}$

$B = \{8, 9, 10, 11\}$

What is $A \oplus B$?

Also prove $A \cap B \subseteq A$, $A \subseteq A \cup B$, $A \cap B \subseteq B$, $B \subseteq A \cup B$

What can you deduce from this?

9) Among a group of students, 30 played tennis, 30 played rugby and 30 played volley-ball. 15 played both tennis and rugby, 20 played both rugby and volley-ball, 15 played tennis and volley ball and 10 played all three. If every student played at least one game,

- a. find the number of students and how many played only tennis, only rugby and only volley-ball? Show your work and also draw required Venn diagrams.
- b. Suppose there were 70 students how many played none of the 3 games?

10) (i) Prove De Morgan's Law using an example and Venn Diagram. (includes both laws).

(ii) Prove the following properties/laws using Venn Diagrams and examples

- a) $A - B = A \cap B^c$
- b) $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
- c) $n(A \cup B) = n(A - B) + n(A \cap B) + n(B - A)$
- d) $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$
- e) $(A \cup B) - C = (A - C) \cup (B - C)$