Homework on sets

1. let the universe be the set U = {1,2,3,4,…,10}, A = {1,4,7,10}, B = {1,2,3,4,5}, C = {2,,4,6,8} list the elements for the following sets.

    a. B'∩(C – A)
    b. B – A
    c. B Δ A
2. Show that A = {3,2,1} and B = {1,2,3} are equal
3. Show that {X | xϵ R and x > 0 and x < 3 } and { 1,2} are equal.
4. Show that A = { x | x^3 - $2x^2$ - x + 2 = 0} is not a subset of B = { 1, 2}
5. Use a Ven diagram and shade the given set. ((C ∩ A) – (B – A)' ∩ C)
6. A television poll of 151 persons found that 68 watched " Law and Disorder", 61 watched "25" , 52 watched "The tenors" , 16 watched both "Law and " Disorder" and " 25", 25 watched "25 " and "The Tenors" and 26 watched none of these shows. 19 people watched "The Tenors" and "Law and Disorder". How many persons watched all of the three shows?
7. In a group of students, each student is taking a Mathematics course or a computer science course. One-fifth of these taking Math course are also taking Computer Science course. And one-eighth of those taking a Computer Science course are also taking A Math course. Are more than one-third of the students taking A math course? Use Ven Diagram
8. List all the partitions of the set { a, b, c, d}
9. Answer true/false to the following questions. P stands for power set.

    a. {2}⊆ P({1,2})
    b. {x} ⊆ {x, {x}}
    c. {x} ϵ {x}
10. list the members of P({a,b,c,d}) which are proper subsets of {a,b,c,d}
11. if the set X has n members, how many proper subsets does X have?
12. Let X = {1,2} , Z = { 2, B}. list all the elements of the relation X x Z x X.
13. Let S = { 1,2,3,..9} provide two partitions of s.

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HOMEWORK 05
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1. $U = \{1,2,3,4,\ldots,10\}$
$A = \{1,4,7,10\}$
$B = \{1,2,3,4,5\}$
$C = \{2,4,6,8\}$

(a) $B' \cap (C-A)$
- $C-A = \{2,6,8\}$
- $B' = \{6,7,8,9,10\}$

$B' \cap (C-A) = \boxed{\{6,8\}}$

(b) $B-A = \boxed{\{2,3,5\}}$

(c) $B \Delta A = (A-B) \cup (B-A)$
- $A-B = \{7,10\}$
- $B-A = \{2,3,5\}$

$(A-B) \cup (B-A) = \boxed{\{2,3,5,7,10\}}$

2. $A = \{3,2,1\}$, $B = \{1,2,3\}$
if $\{x \mid x \in A, x \in B\}$ and $\{x \mid x \in B, x \in A\}$,
therefore, $A = B$

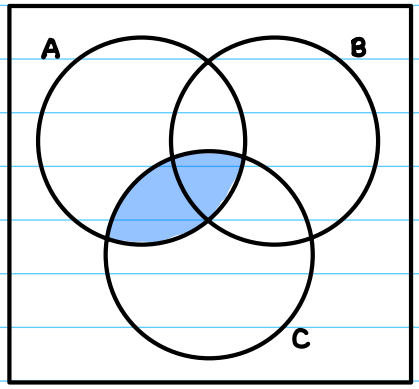
3. let $A = \{x \mid x \in R \text{ and } x > 0 \text{ and } x < 3\}$, $B = \{1,2\}$
$x > 0 = \{0.1, 0.2, 0.3, \ldots\}$ (ALL REAL NUMBERS)
$x < 3 = \{\ldots, 2.7, 2.8, 2.9\}$
$A = 0 < x < 3 = \{0.1, 0.2, \ldots, 2.8, 2.9\}$
$A \neq B$

4. $A = \{x \mid x^3 - 2x^2 - x + 2 = 0\}$ $B = \{1,2\}$
if $x = -1 : (-1)^3 - 2(-1)^2 - (-1) + 2 = 0$
$0 = 0$ ✓

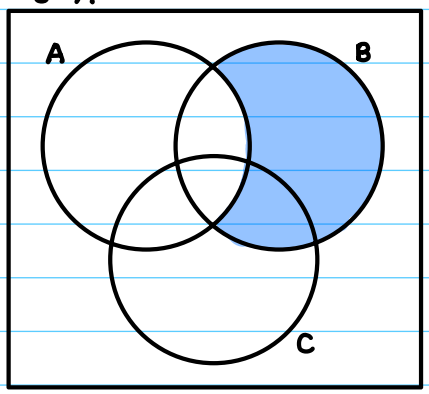
Therefore, $A \nsubseteq B$

5. $[(C \cap A) - (B - A)' \cap C]$

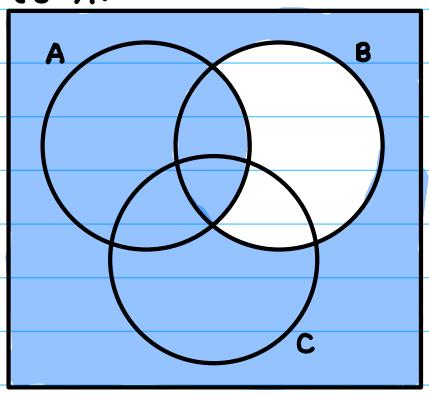
- $C \cap A$



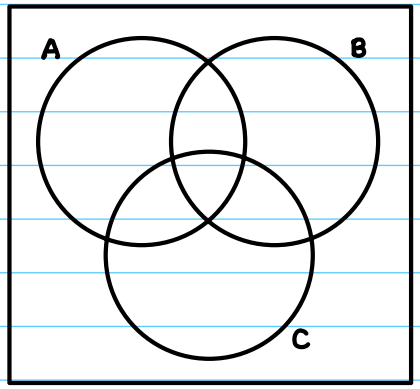
- $B - A$



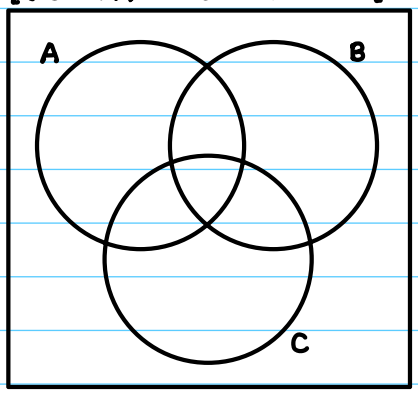
$(B - A)'$



- $(C \cap A) - (B - A)'$



- $[(C \cap A) - (B - A)' \cap C]$

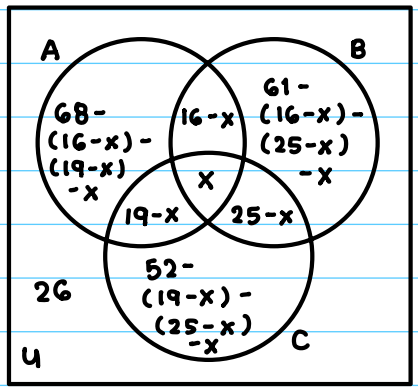


6. let U = 151 persons

A = watched "Law and Disorder"

B = watched "25"

C = watched "The Tenor"



$A = 68$ $\quad A \cap B = 16$

$B = 61$ $\quad B \cap C = 25$

$C = 52$ $\quad A \cap C = 19$

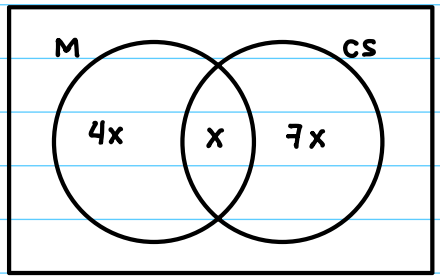
$U = 151 = 26 + (33+x) + (20+x) + (8+x) + (19-x) + (16-x) + (25-x) + x$

$151 = 147 + x$

$x = 4$

4 person watched all of the three shows

7. Let x = student taking both Math and CS course



Ratio : $\frac{M}{\text{Total}} = \frac{5n}{12n} = \frac{5}{12} > \frac{1}{3}$

There are more than 1/3 of the students taking a Math course.

8. All partitions of the set $\{a,b,c,d\}$

$\{\}, \{a\}, \{b\}, \{c\}, \{d\}, \{a,b\}, \{a,c\}, \{a,d\}, \{b,c\}, \{b,d\}, \{c,d\}, \{a,b,c\}, \{a,b,d\}, \{a,c,d\}, \{b,c,d\}, \{a,b,c,d\}$

9. (a) $\{2\} \subseteq P(\{1,2\})$ $\quad P(\{1,2\}) = \{\{1,2\}, \{1\}, \{2\}, \{\}\}$

false

(b) $\{x\} \subseteq \{x, \{x\}\}$

True

(c) $\{x\} \in \{x\}$

false

10. $P(\{a,b,c,d\}) = \{\{\}, \{a\}, \{b\}, \{c\}, \{d\}, \{a,b\}, \{a,c\},$
$\{a,d\}, \{b,c\}, \{b,d\}, \{c,d\}, \{a,b,c\},$
$\{a,b,d\}, \{a,c,d\}, \{b,c,d\}, \{a,b,c,d\}\}$

$P = 2^4 = 16$

Proper subsets of $\{a,b,c,d\}$:

$\{\}, \{a\}, \{b\}, \{c\}, \{d\}, \{a,b\}, \{a,c\},$
$\{a,d\}, \{b,c\}, \{b,d\}, \{c,d\}, \{a,b,c\},$
$\{a,b,d\}, \{a,c,d\}, \{b,c,d\}$

11. $P(x) = 2^n$

proper subsets $X : 2^n - 1$

12. $X = \{1,2\}$, $Z = \{2,B\}$ $\quad X \times Z \times X$

$X \times Z = \{(1,2), (1,B), (2,2), (2,B)\}$

$X \times Z \times X = \{(1,2,1), (1,B,1), (2,2,1), (2,B,1),$
$(1,2,2), (1,B,2), (2,2,2), (2,B,2)\}$

13. $S = \{1,2,3,\ldots,9\}$

$S_1 = \{1,3,5,7,9\}$

$S_2 = \{2,4,6,8\}$