* Exercise set 5.1 :-

2- is $4 = \{4\}$? Explain.

No, 4 is element

$\{4\}$ is set.

3- which of the following sets are equal?

$A = \{0, 1, 2\}$

$B = \{x \in R \mid -1 \leq x < 3\}$

$C = \{x \in R \mid -1 < x < 3\}$

$D = \{x \in Z \mid -1 < x \leq 3\} = \{0, 1, 2\}$

$E = \{x \in Z^+ \mid -1 < x < 3\} = \{1, 2\}$

$\therefore A = D$

4- Indicate the elements in each set

b) $T = \{m \in Z \mid m = 1 + (-1)^i$, for some integer $i\}$

$\therefore T = \{0, 2\}$

e) $w = \{t \in Z \mid -1 < t < -3\}$

$\therefore w = \phi$

f) $X = \{u \in Z \mid u < 4$ or $u \geq 1\}$

$\therefore X = Z$ (all integers)

5- c- is $\phi \in \{\phi\}$? why?

True, Because $\{\phi\}$ is a set that Contain one element $= \phi$

d- is $\phi \subseteq \phi$? why?

false, Because ϕ is an empty set doesn't Contain any element.

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PAGE

DATE

7. Let $A=\{c,d,f,g\}$, $B=\{f,i\}$ and $C=\{d,g\}$. answer each of the following Questions. give reason for your answer.

a. is $B \subseteq A$?

No, Because $i \in B$ and $i \notin A$

b. is $C \subseteq A$?

yes, Because all elements in C are also in A

c. is $C \subseteq C$?

yes, Because $C=C$, it's a subset of itself.

8. a. is $3 \in \{1,2,3\}$? yes

b. is $1 \subseteq \{1\}$? No

c. is $\{2\} \in \{1,2\}$? No

d. is $\{3\} \in \{1,\{2\},\{3\}\}$? yes

e. is $1 \in \{1\}$? yes

f. is $\{2\} \subseteq \{1,\{2\},\{3\}\}$? No

g. is $\{1\} \subseteq \{1,2\}$? yes

h. is $1 \in \{\{1\},2\}$? No

i. is $\{1\} \subseteq \{1,\{2\}\}$? yes

j. is $\{1\} \subseteq \{1\}$? yes

9. let $A=\{1,3,5,7,9\}$, $B=\{3,6,9\}$, $C=\{2,4,6,8\}$ Find each of the following:-

a. $A \cup B = \{1,3,5,6,7,9\}$

b. $A \cap B = \{3,9\}$

c. $A \cup C = \{1,2,3,4,5,6,7,8,9\}$

d. $A \cap C = \phi$

e. $A - B = \{1,5,7\}$

f. $B - A = \{6\}$

g. $B \cup C = \{2,3,4,6,8,9\}$

h. $B \cap C = \{6\}$

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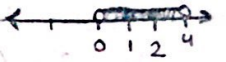
PAGE
DATE

10- let the universal set be the set R of all real numbers and
let $A=\{x\in R \mid 0<x\leq 2\}$
$B=\{x\in R \mid 1\leq x<4\}$
$C=\{x\in R \mid 3\leq x<9\}$. find each of the following :-

a- $A\cup B=\{x\in R \mid 0<x<4\}$



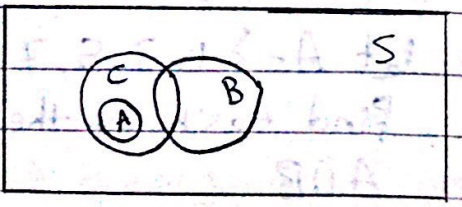
b- $A\cap B=\{x\in R \mid 1\leq x\leq 2\}$
c- $A^c=\{x\in R \mid x\leq 0 \text{ or } x>2\}$
i- $(A\cap B)^c=\{x\in R \mid x<1 \text{ or } x>2\}$

12- Indicate which of the following relationships are true and which are false :-

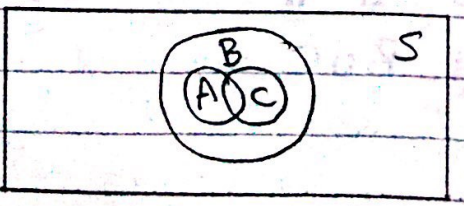
a- $Z^+\subseteq Q$ True
b- $R^-\subseteq Q$ false
c- $Q\subseteq Z$ false
d- $Z^-\cup Z^+=Z$ false
e- $Z^-\cap Z^+=\phi$ True
f- $Q\cap R=Q$ True
g- $Q\cup Z=Q$ True
h- $Z^+\cap R=Z^+$ True
i- $Z\cup Q=Z$ false

19- Draw venn diagrams to describe sets A, B, C that satisfy the given conditions :-

a- $A\cap B=\phi$, $A\subseteq C$, $C\cap B\neq\phi$



b- $A\subseteq B$, $C\subseteq B$, $A\cap C\neq\phi$



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22_b_ is $\{\{w, x, v\}^{A_1}, \{u, y, q\}^{A_2}, \{p, z\}^{A_3}\}$ a Partition of $A = \{p, q, u, v, w, x, y, z\}$?

① $A = A_1 \cup A_2 \cup A_3$ ✓
② $A_1 \cap A_2 \cap A_3 = \phi$ ✓
∴ it is a Partition.

d_ is $\{\{3, 7, 8\}^{A_1}, \{2, 9\}^{A_2}, \{1, 4, 5\}^{A_3}\}$ a Partition of $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$?

① $A = A_1 \cup A_2 \cup A_3$ ✗
② $A_1 \cap A_2 \cap A_3 = \phi$ ✓
∴ it is not a Partition.

26_ suppose $A = \{1, 2\}$ and $B = \{2, 3\}$. find each of the following

a_ $P(A \cap B)$

→ $A \cap B = \{2\}$, $P(A \cap B) = \{\phi, \{2\}\}$

b_ $P(A) = \{\phi, \{1\}, \{2\}, \{1, 2\}\}$

c_ $P(A \cup B)$

→ $A \cup B = \{1, 2, 3\}$

$P(A \cup B) = \{\phi, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$

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