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Date / / Subject 23010312

Sheet 5

Q1: ~~an~~ $A = \{0,1,2\}$ $C =]-1,3[$ $D = \{0,1,2\}$ $E = \{1,2\}$ So $A = D$ as $A \subseteq D$ and $D \subseteq A$

Q2: a. Set of integers ~~where~~ which equal 1, -1 based on some integer K $S = \{-1,1\}$

b. set of integers which equal 0, 2 based on some integer K $T = \{0,2\}$

Q3: ~~a yes, as $f \in A$, and~~ a. No, as $i \notin A$ b. yes, as both $d,g \in A$

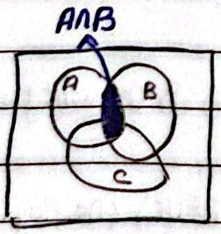
c. yes, as $d,g \in C$ d. yes, as $d,g \in A$ but $c,f \notin a$

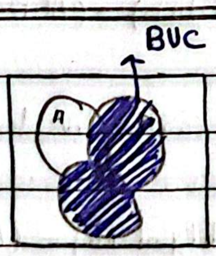
Q4: $A =]0,2]$ $B = [1,4[$

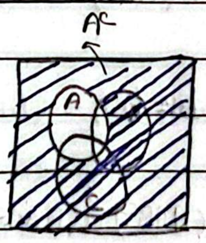
a. $]0,4[$ b. $[1,2]$ c. $]-\infty,0] \cup]2,\infty[$ d. $]-\infty,1[\cup [4,\infty[$ e. $]-\infty,0] \cup [4,\infty[$

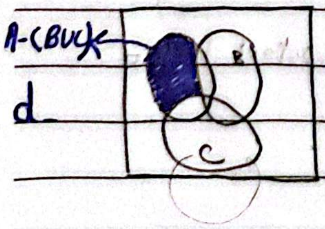
f. $]-\infty,1[\cup]2,\infty[$ g. $]-\infty,1[\cup]2,\infty[$ h. $]-\infty,0] \cup [4,\infty[$

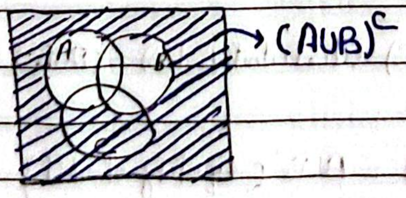
Q5:

a. 

b. 

c. 

d. 

e. 

Q6: a. $(A-B) \cup (A \cup B) = (A \cap B^c) \cup (A \cup B) = A \cup (B \cap B^c) = A \cup \emptyset = A$ # True

b. False, let $A = F, B = T, C = T$ $(A \cap B) \cup C = (F \cap T) \cup T = F \cup T = T$

$A \cap (B \cup C) = F \cap (T \cup T) = F \cap T = F$ $\neq$

Date / / Subject

c- False, Let $A=\{3,4\}$, $B=\{1,2\}$, $C=\{3,4,5,6\}$ so $A\not\subseteq B$ and $B\not\subseteq C$ but $A\subseteq C$.

d- False, Let $A=\{1,2\}$, $B=\{1,2\}$, $C=\{5,6\}$, $A\cup C=B\cup C=\{1,2,5,6\}$ but $A\neq C$

Q7: a- let element $x\in[(A-B)\cap(A\cap B)]$, so $x\in(A-B)$ and $x\in(A\cap B)$

for $x\in(A-B)$: $x\in A$ and $x\notin B$ for $x\in(A\cap B)$: $x\in A$ and $x\in B$

so we have $x\notin B$ and $x\in B$ # contradiction that means $(A-B)\cap(A\cap B)=\emptyset$

b- $\mathcal{P}(A)=\{\emptyset,\{a\},\{b\},\{c\},\{d\},\{a,b\},\{a,c\},\{a,d\},\{b,c\},\{b,d\},\{c,d\},\{a,b,c\},$
$\{a,b,d\},\{b,c,d\},\{a,c,d\},\{a,b,c,d\}\}$

c- b and d

d- 1 $\{\{1\},\{2\},\{3\}\}$ 2 $\{\{1,2\},\{3\}\}$ 3 $\{\{1,3\},\{2\}\}$ 4 $\{\{1\},\{2,3\}\}$ 5 $\{\{1,2,3\}\}$

Q8: a- $(A-B)-C=(A-B)\cap C^c$ (equality of diff.) $=(A\cap B^c)\cap C^c$ (equality of diff.) $=$

$A\cap C^c\cap B^c$ (Commutative law) $=(A\cap C^c)\cap B^c$ (associative law) $=(A-C)-B$ (equality of diff.)

b- $(A-B)-(B-C)=(A\cap B^c)\cap(B\cap C^c)^c$ (equality of diff.) $=(A\cap B^c)\cap(B^c\cup C)$ (De Morgan Law) $=$

$(A\cap B^c\cap B^c)\cup(A\cap B^c\cap C)$ (distributive law) $=(A\cap B^c)\cup(A\cap B^c\cap C)$ (Idempotent law) $=$

$A\cap B^c$ (Absorption law) $=A-B$ (equality of diff.)

c- $(A-B)\cup(B-A)=(A\cap B^c)\cup(B\cap A^c)$ (equality of diff.) $=((A\cap B^c)\cup B)\cap((A\cap B^c)\cup A^c)$ (distribution law) $=$

$((A\cup B)\cap(B^c\cup B))\cap((A\cup A^c)\cap(B^c\cup A^c))$ (distribution) $=((A\cup B)\cap U)\cap(U\cap(A^c\cup B^c))=(A\cup B)\cap(A^c\cup B^c)$
(intersection with U)

$=(A\cup B)\cap(A\cap B)^c$ (de-Morgan) $=(A\cup B)-(A\cap B)$ (equality of diff.)

d- $A\cup(B-A)=A\cup(B\cap A^c)$ (equality of diff.) $=(A\cup B)\cap(A\cup A^c)$ (distribution) $=(A\cup B)\cap U=A\cup B$ (intersection with U)