Math 3283W: solutions for skills problems due 25 September

(5.4) *(a)* $A \cap B = \{2,4,6,8\} \cap \{1,2,3,4\} = \{2,4\}$.

(b) $A \cup B = \{2,4,6,8\} \cup \{1,2,3,4\} = \{1,2,3,4,6,8\}$.

(c) $A \setminus B = \{2,4,6,8\} \setminus \{1,2,3,4\} = \{6,8\}$.

(d) $B \cap C = \{1,2,3,4\} \cap \{5,6,7\} = \emptyset$.

(e) $B \setminus C = \{1,2,3,4\} \setminus \{5,6,7\} = \{1,2,3,4\}$.

(f) $(B \cup C) \setminus A = (\{1,2,3,4\} \cup \{5,6,7\}) \setminus \{2,4,6,8\} = \{1,2,3,4,5,6,7\} \setminus \{2,4,6,8\} = \{1,3,5,7\}$.

(g) $(A \cap C) \setminus B = (\{2,4,6,8\} \cap \{5,6,7\}) \setminus \{1,2,3,4\} = \{6\} \setminus \{1,2,3,4\} = \{6\}$.

(h) $C \setminus (A \cup B) = \{5,6,7\} \setminus (\{2,4,6,8\} \cup \{1,2,3,4\}) = \{5,6,7\} \setminus \{1,2,3,4,6,8\} = \{5,7\}$.

(5.5) See "diagram page".

(5.6) *(a)* $(A \cup B) \cup (U \setminus A) = (A \cup (U \setminus A)) \cup B = U \cup B = U$.

(c) $A \cap ((B \cup (U \setminus A)) = (A \cap B) \cup (A \cap (U \setminus A)) = (A \cap B) \cup \emptyset = A \cap B$.

(e)

$$\begin{aligned}(A \cup B) \cap (A \cup (U \setminus B)) &= ((A \cup B) \cap A) \cup ((A \cup B) \cap (U \setminus B)) \\ &= [(A \cap A) \cup (B \cap A)] \cup [(A \cap (U \setminus B)) \cup (B \cap (U \setminus B))] \\ &= A \cup (A \cap B) \cup (A \setminus B) \cup \emptyset \\ &= A.\end{aligned}$$

(5.7) *(a)* See "diagram page".

(b) $A \Delta A = (A \setminus A) \cup (A \setminus A) = \emptyset \cup \emptyset = \emptyset$.

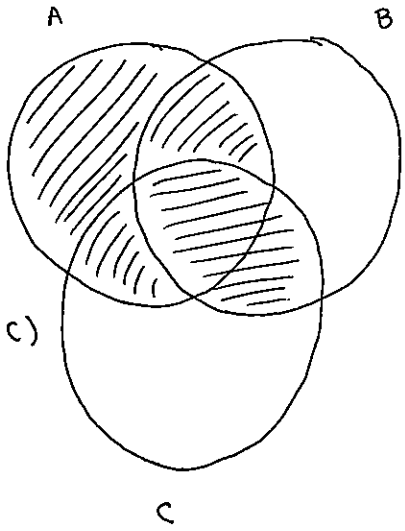
(c) $A \Delta \emptyset = (A \setminus \emptyset) \cup (\emptyset \setminus A) = A \cup \emptyset = A$.

(d) $A \Delta U = (A \setminus U) \cup (U \setminus A) = \emptyset \cup (U \setminus A) = U \setminus A$.

(5.16) *(b)* and *(d)* allow us to conclude $x \notin A \setminus B$. x could belong to both A and B and the statement of *(a)* would still be true, so *(a)* does not yield the desired conclusion; neither does *(c)*, as the statement of *(c)* implies $x \in A \setminus B$ or $x \in B \setminus A$ but does not tell us which of these two must hold.

Venn Diagrams for skills problems due $9/25$ (Math 3283W)

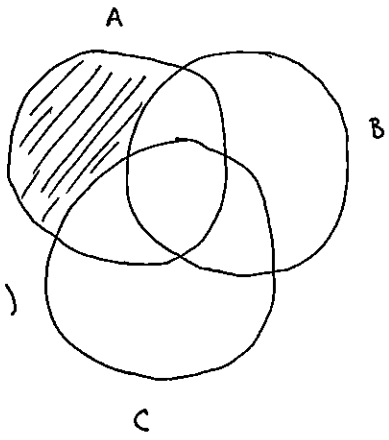
5.5(a)



$A \cup (B \cap C)$

$= (A \cup B) \cap (A \cup C)$

5.5(b)

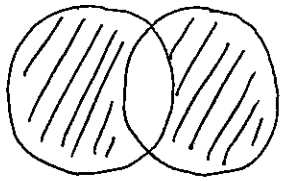


$A \setminus (B \cup C) =$

$(A \setminus B) \cap (A \setminus C)$

5.7(a)

$A \triangle B =$



the set of elements of $A \cup B$ belonging to

A or B but not both

$$(A \triangle B) = (A \cup B) \setminus (A \cap B)$$

$$= (A \setminus B) \cup (B \setminus A)$$