2(c)

$$A \subseteq B \text{ and } A \subseteq C \iff A \subseteq (B \cap C)$$

if and only if

$\Rightarrow$ suppose $A \subseteq B$ and $A \subseteq C$.

To show that $A \subseteq (B \cap C)$.

$A \subseteq B \Rightarrow$ If $x \in A$, then $x \in B$

$A \subseteq C \Rightarrow$ If $x \in A$, then $x \in C$.

$\Rightarrow$ If $x \in A$, then $x \in B$ and $x \in C$

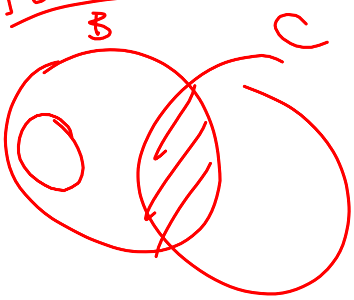
$\Rightarrow$ If $x \in A$, then $x \in B \cap C$.

$\Rightarrow A \subseteq (B \cap C)$

2(d)

$$A \subseteq B \text{ or } A \subseteq C \iff A \subseteq (B \cap C)$$

$\Rightarrow$ fails



$A = \{1\}$

$B = \{1, 2\}$

$C = \{2, 3\}$

2 (o) $A\times(B-C)=(A\times B)-(A\times C)$

$\supseteq$: Let $(x,y)\in(A\times B)-(A$ ← True

$(x,y)\in(A\times B)$ AND $(x,y$

$x\in A$ AND $y\in B$ AND $(x\notin$

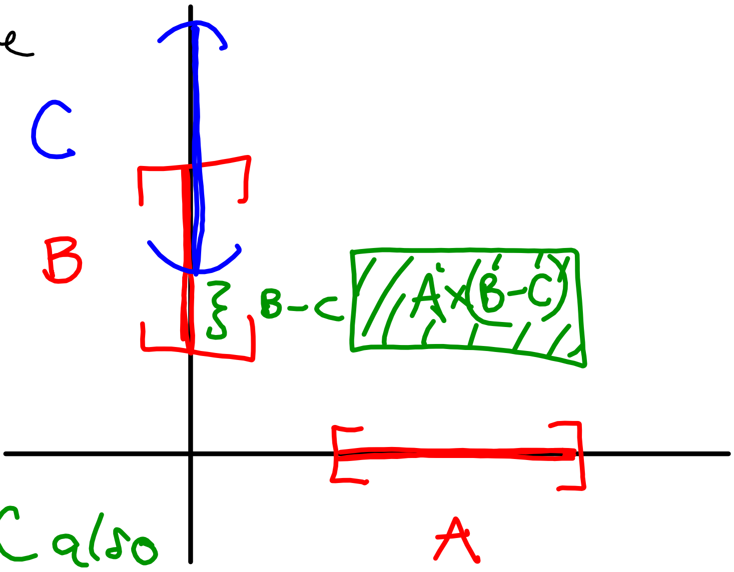
Case 1:

$x\in A$ and $y\in B$ and $x\notin A$

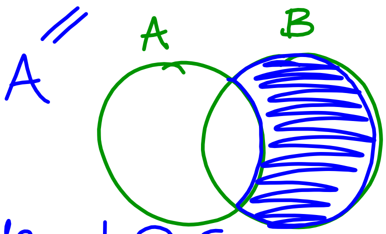
only true if $A=\emptyset$

~~could exist e.g.~~

even though y might be in C also



2(f) $A-(B-A)\overset{\supseteq}{=}A-B$



attempt @ $\subseteq$

Let $x\in A-(B-A)$

$\Rightarrow x\in A$ and $x\notin(B-A)$

$\Rightarrow x\in A$ and $(x\notin B$ or $x\in A)$

Case 1: $x\in A$ and $x\notin B$
$\Rightarrow x\in A-B$

Case 2: $x\in A$ and $x\in A$.
$\Rightarrow x\in A$

$x\in(B-A)\Rightarrow x\in B$ and $x\notin A$

$x\notin(B-A)\Rightarrow x\notin B$ or $x\in A$