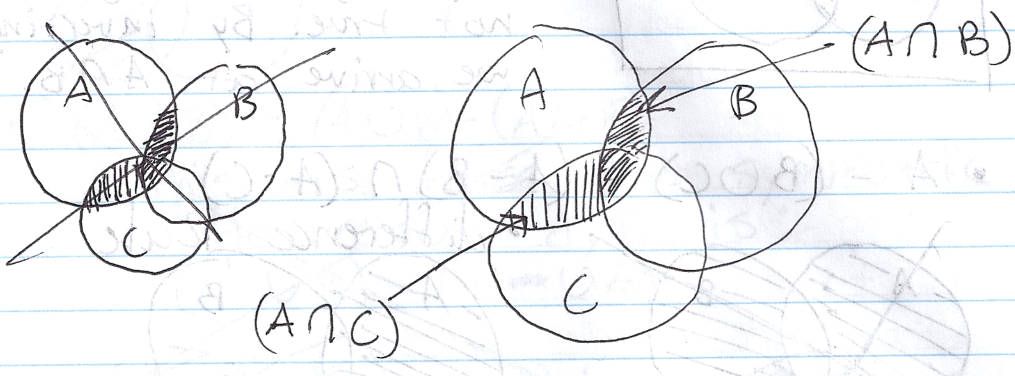
3.4

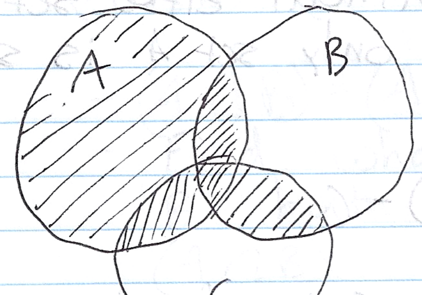
• $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

Distributive ~~commutative~~ property - the 'A' distributes into the 'or' expression similar to, $A \cdot (B + C) = AB + AC$



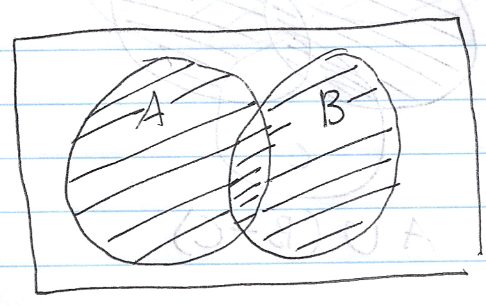
• $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

Distributive ~~commutative~~ property - the 'A' is again distributed into the expression.



• $A \cup B = \overline{\bar{A} \cap \bar{B}}$

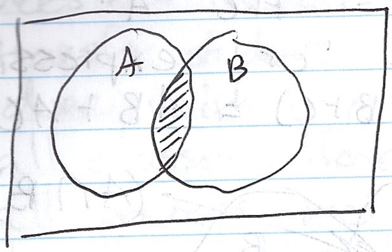
$\overline{\bar{A} \cap \bar{B}} = A \cup B$ De morgans Law



$\bar{A} \cap \bar{B}$ is equal to the square without the circles. By 'NOT' of that expression we arrive at $A \cup B$.

• $\overline{A \cap B} = \bar{A} \cup \bar{B}$

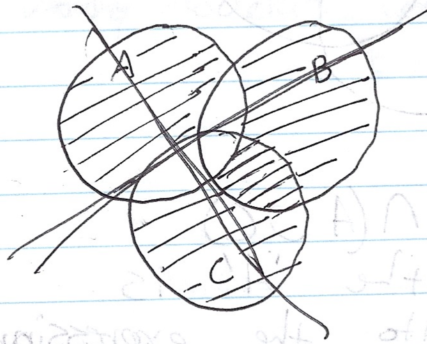
$\overline{\bar{A} \cup \bar{B}} = A \cap B$ De morgans Law

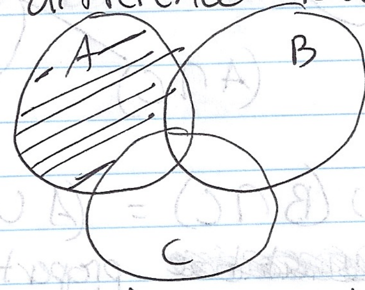


• $\bar{A}$ and $\bar{B}$ can be anything as long as $A \cap B$ is not true. By inverting the expression we arrive at $A \cap B$.

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

• difference Rule





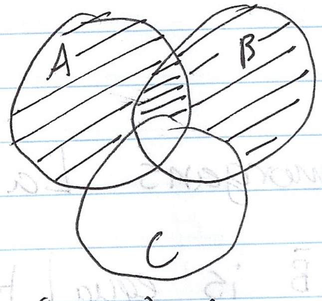
• Set difference: $A - B = (A \cap B^c)$

• The set A without either set B or C which means only set A is selected

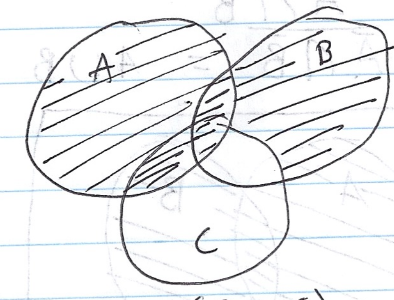
• $A \cup (B - C) = (A \cup B) - C$

$B - C = B \cap C^c$

• The Set of A or B without C.



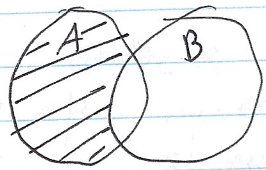
$(A \cup B) - C$



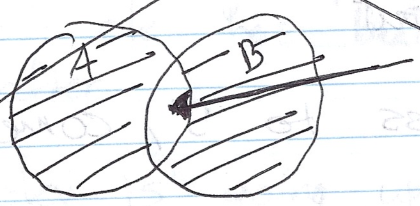
$A \cup (B - C)$

• Not equal!!

- $(A \cup B) - B = A$
  - this is removing the set 'B' completely, leaving only A



- ~~$(A \Delta B) = (A \cup B) - (A \cap B)$~~
  - ~~this is false, the symmetric difference of A, B is:~~
    ~~$(A \cup B) - (B \cup A)$~~



~~Notice $A \cap B$ is not highlighted.~~

- $(A \Delta B) = (A \cup B) - (A \cap B)$
  - $(A \Delta B) = (A - B) \cup (B - A)$
  - Find what is in 'A' or 'B' but does not appear in $(A \cap B)$