DOUBLEROOT

Cheat Sheet – Sets

Notation

Roster Form

A = {a, e, i, o, u} B = {1, 2, 3, 4, 5, 6}

Set Builder Form

A = $\{x: x \text{ is a vowel of the English alphabet}\}$ B = $\{x: x \in \mathbb{N}, x \le 6\}$

Subset

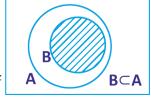
 $A \subseteq B$, if $x \in A \Rightarrow x \in B \ \forall \ x \in A$

Properties

 $A \subseteq A$

 $\varphi \subseteq A$

 $A\subseteq B\Rightarrow B^c\subseteq A^c$



 $A \subseteq B, B \subseteq A \iff A = B$

 $A \subseteq B, B \subseteq C \Rightarrow A \subseteq C$

 $A \subseteq A \cup B$

 $A \subseteq B, A \subseteq C \Rightarrow A \cup B \subseteq C$

$A \cap B \subseteq A$

 $C \subseteq A, C \subseteq B \Rightarrow C \subseteq A \cap B$

Complement

 $A^c = \{x: x \notin A \text{ and } x \in U\}$

Properties

 $(A^c)^c = A$



 $\Phi^c = U$



 $(A \cup B)^c = A^c \cap B^c$

 $(A \cap B)^c = A^c \cup B^c$

Union

 $A \cup B = \{x: x \in A \text{ or } x \in B\}$

Properties

 $A \cup A = A$

 $A \cup \Phi = A$

 $A \cup A^c = U$

 $A \cup U = U$

 $A \cup B = B \cup A$

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

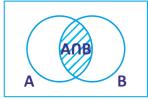
Intersection

 $A \cap B = \{x : x \in A \text{ and } x \in B\}$

Properties

 $A \cap A = A$

 $A \cap \phi = \phi$



$$A \cap A^c = \varphi$$

 $A \cap U = A$

 $A \cap B = B \cap A$

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

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

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

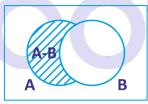
Difference

 $A - B = \{x : x \in A \text{ and } x \notin B\}$

Properties

 $A - A = \phi$

 $\Phi - A = \Phi$



$$A - \phi = A$$

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

 $U - A = A^c$

 $A - U = \phi$

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

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

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

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

Cartesian Product

 $A \times B = \{(x, y) : x \in A \text{ and } y \in B\}$