

Theorem (Useful Set Identities)

De Morgan's Laws:

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

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

Set Difference as Intersection:

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

Idempotent:

$$A \cup A = A = A \cap A$$

Associative Laws:

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

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

Commutative Laws:

$$A \cup B = B \cup A$$

$$A \cap B = B \cap A$$

Distributive Laws:

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

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

Direct Products:

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

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

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