

If independent,

then $P(A \cap B) = P(A) \cdot P(B)$

$$P(A|B) = P(A)$$

Always,

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

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

$$P(A^c \cap B^c) = 1 - P(A \cup B)$$

$$P(A \cap B^c) = P(A) - P(A \cap B)$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$P(A \cap B) = P(B) \cdot P(A|B)$$

If mutually exclusive,

$$P(A \cap B) = 0$$