Probability

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

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

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

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

If $P(A) = x$ and $P(A \cup B) = y$, find $P(B)$

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

$$x = y + P(B) - yP(B)$$

$$x - y = (1 - y)P(B)$$

$$\frac{x - y}{1 - y} = P(B)$$

Mutually exclusive: $P(A \cap B) = 0$