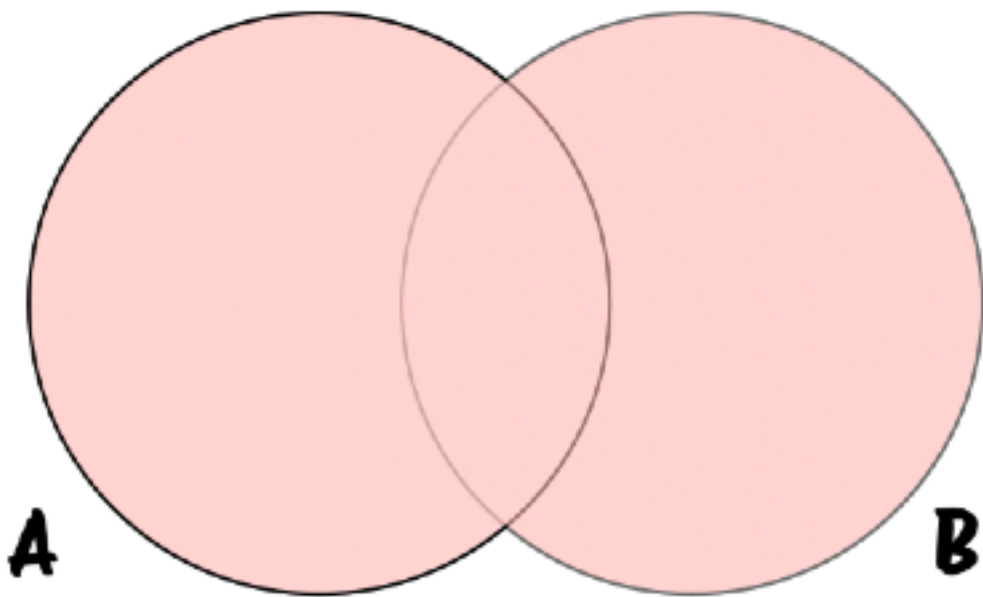


providing miles

The Addition Rule





Ω

probability rules

The Addition Rule

If A and B are events in the sample space Ω , then

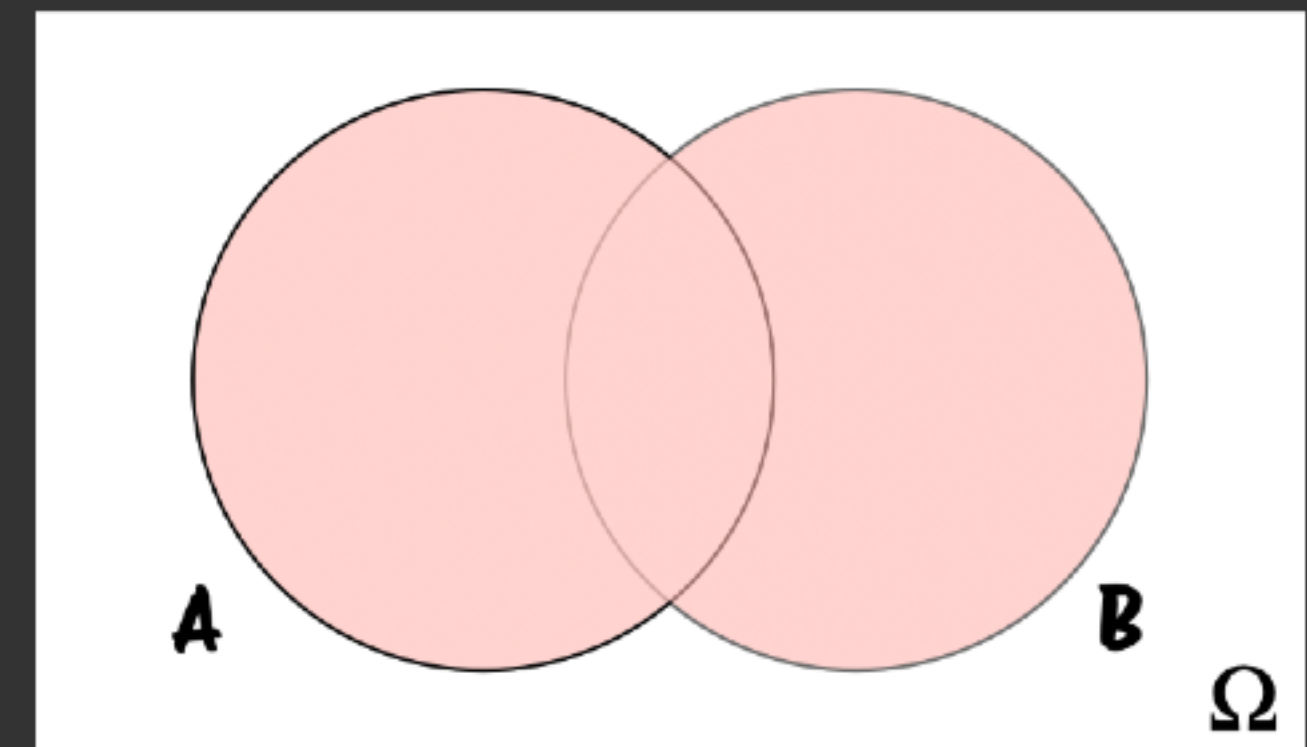
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Proof:

Let $a = P(A \cap \bar{B})$, $b = P(A \cap B)$, $c = P(B \cap \bar{A})$

$$P(A \cup B) = a + b + c$$

$$P(A) + P(B) - P(A \cap B) = [a + b] + [b + c] - b = a + b + c$$



probability rules

Inclusion-Exclusion Rule

For three events A , B , C

$$P(A \cup B \cup C) = P(A) + P(\bar{A} \cap B) + P(\bar{A} \cap \bar{B} \cap C)$$

$$\begin{aligned} P(A \cup B \cup C) = & P(A) + P(B) + P(C) \\ & - P(A \cap B) - P(A \cap C) - P(B \cap C) \\ & + P(A \cap B \cap C) \end{aligned}$$

