



FORMULAS YOU MUST KNOW

$$0 \leq P(A) \leq 1$$

Range:

$$P(A') = 1 - P(A)$$

Complement:

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

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

$$P(A \cap B) = P(A) \cdot P(B), \quad P(A | B) = P(A), \quad P(A | B') = P(A)$$

$$P(\text{win}) = \sum_{k=0}^{\infty} (1-p)^{2k} \cdot p = \frac{p}{1 - (1-p)^2}$$

$$P(U) = 1, \quad P(\emptyset) = 0$$

Universal set:

$$P(A) = \frac{n(A)}{n(U)}$$

Equally likely:

$$P(A \cap B') + P(A \cap B) + P(B \cap A')$$

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

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

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

KEY METHODS

- You never actually need the formula — always draw the tree. The denominator must always be the total $P(B)$, never 1.

EXAM TRAPS TO AVOID

- $P(A | B) \neq P(B | A)$ in general. Their denominators are different: $P(A | B) = \frac{P(A \cap B)}{P(B)}$ and $P(B | A) = \frac{P(A \cap B)}{P(A)}$. Swapping these silently kills marks.