# Maths Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 30

## Probability

### Classical probability

$$P(A) = \frac{n(A)}{n(S)}, \qquad P(A') = 1 - P(A)$$

ADDITION

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

THREE EVENTS

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

### Conditional probability and independence

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}, \qquad P(A \cap B) = P(A)\,P(B \mid A)$$

INDEPENDENT EVENTS

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

### Total probability and Bayes' theorem

TOTAL PROBABILITY

$$P(A) = \sum_i P(E_i)\,P(A \mid E_i)$$

BAYES

$$P(E_i \mid A) = \frac{P(E_i)\,P(A \mid E_i)}{\sum_j P(E_j)\,P(A \mid E_j)}$$

## Random variables and binomial distribution

MEAN AND VARIANCE

$$\mu = \sum x_i p_i, \qquad \sigma^2 = \sum x_i^2 p_i - \mu^2$$

BINOMIAL

$$P(X = r) = {}^{n}C_r \, p^r q^{n-r}, \qquad q = 1 - p; \qquad \mu = np, \;\; \sigma^2 = npq$$

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