

# Continuous Distribution - Binomial - Exam Questions

## 1 Conditions

Conditions for a binomial distribution:

- There are a fixed number of trials, **n**
- There are two outcomes (success and failure)
- Each trial is independent
- The probability of success is constant, **p**

## 2 Finding probabilities

*Bhim and Joe play each other at badminton and for each game, independently of all others, the probability that Bhim loses is 0.2*

*Find the probability that, in 9 games:*

### 2.1 P(X=?)

*Exactly 3 of the games*

#### 2.1.1 Method 1 - Tables

Let X be the number of games lost

$$X \sim B(9, 0.2)$$

Write the question in terms of inequalities (so tables can be used)

$$P(X = 3) = P(X \leq 3) - P(X \leq 2)$$

Look up the values on the tables

$$0.9144 - 0.7382 = 0.1762$$

#### 2.1.2 Method 2 - Formula

Let X be the number of games lost

$$X \sim B(9, 0.2)$$

Write down the probability to be found:

$$P(X = 3)$$

Use the formula on the data sheet:

$$\binom{n}{x} p^x (1-p)^{n-x}$$

Substitute values:

$$\binom{9}{3} \times (0.2)^3 \times (1 - 0.2)^{9-3} = 0.1762$$

### 2.2 P(X>?) or P(X<?)

*Fewer than half the games*

Let X be the number of games lost

$$X \sim B(9, 0.2)$$

Write down the probability to be found

$$P(X \leq 4)$$

Look up the value on the tables

$$0.9804$$

If the inequality sign is the other way round subtract the probability from one.

If the value is not on the table, use an approximation

### **2.3 What to do when $p > 0.5$**

Find the probability of the event not happening instead