

Continuous Distribution - Uniform - Exam Questions

1 Conditions

The conditions for a uniform distribution are:

- All values have the same probability

2 Finding probabilities

The probability of any result in a uniform distribution in a range from a to b is:

$$\frac{1}{b-a}$$

2.1 Example

A rectangle has a perimeter of 20 cm. The length, x cm, of one side of this rectangle is uniformly distributed between 1 cm and 7 cm.

Find the probability that the length of the longer side of the rectangle is more than 6 cm long

Write down the distribution

$$X \sim U[1, 7]$$

Find the probability wanted to be found

$$P(X < 4) + P(X > 6)$$

Find each probability

$$P(X > 6) = 1 \times \frac{1}{6} = \frac{1}{6}$$

$$P(X < 4) = 3 \times \frac{1}{6} = \frac{1}{2}$$

Add the probability to find the answer

$$\frac{1}{6} + \frac{1}{2} = \frac{2}{3}$$

3 Mean and Variance

Jean regularly takes a break from work to go to the post office. The amount of time Jean waits in the queue to be served at the post office has a continuous uniform distribution between 0 and 10 minutes.

3.1 Mean

Find the mean time Jean spends in the queue

Write down the distribution

$$X \sim U[0, 10]$$

Use the formula in the formula book

$$\mu = \frac{1}{2}(a+b)$$

$$\mu = \frac{1}{2}(0+10) = 5$$

3.2 Variance

Find the variance of the time Jean spends in the queue

Write down the distribution

$$X \sim U[0, 10]$$

Use the formula in the formula book

$$\text{Variance} = \frac{1}{12}(b-a)^2$$

$$\text{Variance} = \frac{1}{12}(10-0)^2 = \frac{25}{3}$$