

Edexcel (U.K.) Pre 2017

Questions By Topic

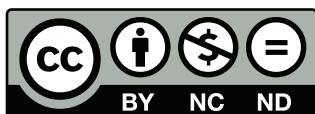
S2 Chap02 Poisson Distribution

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2. The random variable J has a Poisson distribution with mean 4.

(a) Find $P(J \geq 10)$.

(2)

The random variable K has a binomial distribution with parameters $n = 25, p = 0.27$.

(b) Find $P(K \leq 1)$.

(3)

Q2

(Total 5 marks)

6. The probability that a sunflower plant grows over 1.5 metres high is 0.25. A random sample of 40 sunflower plants is taken and each sunflower plant is measured and its height recorded.

- (ii) a Normal approximation.

(b) Write down which of the approximations used in part (a) is the most accurate estimate of the probability. You must give a reason for your answer.

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1. A botanist is studying the distribution of daisies in a field. The field is divided into a number of equal sized squares. The mean number of daisies per square is assumed to be 3. The daisies are distributed randomly throughout the field.

Find the probability that, in a randomly chosen square there will be

- (a) more than 2 daisies, (3)
- (b) either 5 or 6 daisies. (2)

The botanist decides to count the number of daisies, x , in each of 80 randomly selected squares within the field. The results are summarised below

$$\sum x = 295 \quad \sum x^2 = 1386$$

- (c) Calculate the mean and the variance of the number of daisies per square for the 80 squares. Give your answers to 2 decimal places. (3)
- (d) Explain how the answers from part (c) support the choice of a Poisson distribution as a model. (1)
- (e) Using your mean from part (c), estimate the probability that exactly 4 daisies will be found in a randomly selected square. (2)

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1. (a) Write down the conditions under which the Poisson distribution can be used as an approximation to the binomial distribution.

(2)

The probability of any one letter being delivered to the wrong house is 0.01
On a randomly selected day Peter delivers 1000 letters.

- (b) Using a Poisson approximation, find the probability that Peter delivers at least 4 letters to the wrong house.

Give your answer to 4 decimal places.

(3)

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2. In a village, power cuts occur randomly at a rate of 3 per year.

- (a) Find the probability that in any given year there will be

- (i) exactly 7 power cuts,

- (ii) at least 4 power cuts.

(5)

- (b) Use a suitable approximation to find the probability that in the next 10 years the number of power cuts will be less than 20

(6)

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5. In a village shop the customers must join a queue to pay. The number of customers joining the queue in a 10 minute interval is modelled by a Poisson distribution with mean 3

Find the probability that

- (a) exactly 4 customers join the queue in the next 10 minutes, (2)

- (b) more than 10 customers join the queue in the next 20 minutes. (3)

When a customer reaches the front of the queue the customer pays the assistant. The time each customer takes paying the assistant, T minutes, has a continuous uniform distribution over the interval $[0, 5]$. The random variable T is independent of the number of people joining the queue.

- (c) Find $P(T > 3.5)$ (1)

In a random sample of 5 customers, the random variable C represents the number of customers who took more than 3.5 minutes paying the assistant.

- (d) Find $P(C \geq 3)$ (3)

Bethan has just reached the front of the queue and starts paying the assistant.

- (e) Find the probability that in the next 4 minutes Bethan finishes paying the assistant and no other customers join the queue. (4)
