

1 The random variables X and Y have independent distributions $X \sim \text{Po}(3)$ and $Y \sim \text{Po}(2)$ respectively.

(a) Find $P(2 < X < 5)$.

[2]

(b) Find $P(X + Y > 2)$.

[3]

(c) The total of 100 random values of X and 150 random values of Y is denoted by T .

Use a suitable approximating distribution to find $P(T < 560)$.

[4]

Handwriting practice sheet with 20 rows of dotted lines for tracing and writing.

3 The data produced by a certain data entry firm always include a small number of incorrect characters that occur at random. The proportion of incorrect characters is denoted by p , and experience has shown that $p = 0.0001$. A particular data set from the firm contains 14 500 characters, of which X characters are incorrect.

(a) Use a suitable approximating distribution to find $P(X < 4)$. [3]

The firm’s management wishes to decrease the value of p by giving their employees some training. Their aim is that, for a data set containing 14 500 characters, the value of $P(X = 0)$ for the new value of p should be double the value of $P(X = 0)$ when $p = 0.0001$.

(b) Use a suitable approximating distribution to find the new value of p . [3]

1 The number, X , of used computers donated to a charity has a constant average rate of 2.4 computers per week.

(a) State a necessary condition for X to have a Poisson distribution. [1]

Now assume that X has a Poisson distribution.

(b) Calculate the probability that the number of computers donated during a 4-week period is more than 6 and less than 9. [3]

(c) Use a suitable approximating distribution to calculate the probability that more than 50 computers are donated during a 20-week period. [4]

- 1 It is known that 1% of houses in a certain area have a wind turbine. A random sample of 400 houses in this area is chosen for a survey on domestic heating. The number of houses in the sample that have a wind turbine is denoted by X .

Use a suitable approximating distribution to find $P(X \leq 3)$.

[3]

Handwriting practice lines (dotted lines on a grid background).

- 5

(i) Find $P(3 \leq W+X \leq 5)$.

[2]

The random variable S is the sum of 100 independent values of W and 200 independent values of X .

- (ii)

Use a suitable approximation to find $P(S > 600)$.

[6]

- (b)** The random variable Y has the distribution $\text{Po}(\lambda)$, where $\lambda > 0$.

It is given that $\frac{5}{2}P(Y = 3) + P(Y = 4) = P(Y = 5)$.

Find the value of λ .

[3]

[illegible]