InkMaths

QUESTION WORKBOOK

The Poisson distribution

Further Statistics 1 · Year FM

6 questions · 24 marks

PRINT EDITION

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SECTION A · Warm-up

A1 State the conditions under which a count can be modelled by a Poisson distribution, and name its one parameter. [3]

A2 $X \sim Po(4)$. Find $P(X = 3)$ and $P(X \leq 2)$, each to 4 decimal places. [3]

SECTION B · Standard

B1 Calls arrive at a switchboard at a mean rate of 2.5 per minute, at random. Find the probability of no calls in a two-minute period, and state the variance of the count over that period. [4]

B2 $X \sim Po(6)$. Find $P(X \geq 8)$ to 4 decimal places. [2]

B3 A component fails with probability 0.01, independently. In a batch of 200, use a Poisson approximation to estimate the probability of at most one failure, and compare with the exact binomial value. [5]

SECTION C · Stretch

C1 Two independent sources of faults occur at rates following Po(1.5) and Po(2) per hour. State the distribution of the total number of faults in a three-hour shift, explain why its mean and variance are equal, and find the probability that the shift produces at most 8 faults. [7]