



QUESTION WORKBOOK

The Poisson distribution

Further Statistics 1 · Year FM

6 questions · 24 marks

NAVY SCREEN EDITION

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** $X \sim \text{Po}(4)$. 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** $X \sim \text{Po}(6)$. 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]