



QUESTION WORKBOOK

Hypothesis tests for Poisson and geometric models

Further Statistics 1 · Year FM

7 questions · 25 marks

PRINT EDITION

SECTION A · Warm-up

- A1** Write down suitable hypotheses for testing whether a Poisson rate has increased from a known value of 3. [2]

- A2** Faults occur at $Po(3)$ per batch. A new batch shows 8 faults. Test at the 5% level whether the rate has increased. [3]

SECTION B · Standard

- B1** Accidents at a site follow $Po(10)$ per month. After a safety campaign one month records 4. Test at the 5% level whether the rate has fallen. [4]

- B2** A process is claimed to succeed with probability 0.4 per attempt. The first success comes on the 8th attempt. Test at the 5% level whether the success probability is lower than claimed. [4]

- B3** Explain how a two-tailed test at the 5% level differs in execution from a one-tailed test at the same level. [2]

- B4** A Poisson test has $H_0: \lambda = 4$ against $H_1: \lambda > 4$ at the 5% level. Given that $P(X \leq 7) = 0.9489$ and $P(X \leq 8) = 0.9786$, find the critical region and state the actual significance level. [4]

SECTION C · Stretch

- c1** Cars pass a checkpoint at a mean rate of 2.5 per minute. To test at the 5% level whether the rate has increased, the number passing in a 4-minute period is recorded. Find the critical region and the actual significance level of the test. In the period observed, 18 cars pass. Carry out the test. [6]