InkMaths

QUESTION WORKBOOK

Goodness-of-fit tests

Further Statistics 1 · Year FM

7 questions · 26 marks

PRINT EDITION

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SECTION A · Warm-up

A1 Write down the chi-squared goodness-of-fit statistic, and explain why each squared difference is divided by the expected frequency. [2]

A2 A spinner with five equal sectors is spun 100 times, giving 15, 22, 18, 25 and 20. State suitable hypotheses and compute the chi-squared statistic. [4]

SECTION B · Standard

B1 A spinner with five equal sectors is spun 100 times and gives $\chi^2 = 2.9$ against the hypothesis that it is fair. State the degrees of freedom and the conclusion at the 5% level, given a critical value of 9.488. [3]

B2 The number of flaws in each of 60 components is counted. Twelve have none, 18 have one, 15 have two, 9 have three and 6 have four, and no component has more than four. A Poisson model is to be fitted. Estimate λ from the data and state the degrees of freedom for the test. [4]

B3 Explain the rule for pooling classes, and its effect on the degrees of freedom. [3]

B4 Two goodness-of-fit tests use the same data and the same number of classes. One specifies the model's parameter in advance; the other estimates it from the data. State which has more degrees of freedom, and explain why the estimated version tends to give a smaller statistic. [3]

SECTION C · Stretch

C1 The number of flaws in each of 60 components is counted. Twelve have none, 18 have one, 15 have two, 9 have three and 6 have four, and no component has more than four; λ is estimated from the data as 1.65. Complete the Poisson goodness-of-fit test at the 5% level. The upper 5% points of χ^2 are 7.815 for 3 degrees of freedom and 9.488 for 4. [7]