Chi-squared goodness of fit

Answers

Further Maths topic practice

This topic online

Q	Answer	Marks
1	**a)** H0: the spinner is fair (discrete uniform model fits), H1: the spinner is not fair **b)** 30 **c)** 4 degrees of freedom, critical value 9.488	3
2	H0: visits are uniformly distributed over the five days, H1: they are not. Expected 48 each, $\chi^2 = 8.958 < 9.488$ (4 degrees of freedom), so do not reject H0: no evidence that visits are not equally likely on each day.	6
3	**a)** 53 **b)** 6 classes, 1 constraint (total 300), 6 - 1 = 5 **c)** $\chi^2 = 8.56 < 11.070$, do not reject H0: no evidence the dice is biased	7
4	**a)** 3, 15, 30, 30, 15, 3 **b)** $\chi^2 = 11.422 > 7.815$, reject H0: B(5, 0.5) is not a suitable model	9
5	**a)** mean 0.96, $p = 0.96 \div 6 = 0.16$ **b)** $\chi^2 = 0.895 < 5.991$, do not reject H0: binomial model suitable	9
6	H0: Po(2) is a suitable model, H1: it is not. Expected frequencies 16.24, 32.48, 32.48, 21.65, 10.83, 6.32; $\chi^2 = 1.778 < 11.070$ (5 df), so do not reject H0: the claim is supported.	8
7	**a)** $200 \div 80 = 2.5$ **b)** $\chi^2 = 0.391 < 9.488$, do not reject H0: Poisson model suitable **c)** daisies occur singly, randomly and independently at a constant average rate per square metre	10
8	**a)** r = 44.63, s = 50.20 **b)** 5 classes - 2 constraints (total, λ estimated) = 3 **c)** $0.89 < 7.815$, do not reject H0: Po(1.5) is suitable	7
9	**a)** $\Sigma fx = 1050$, mean = 7, p = 0.7 **b)** $E(10) = 4.24 < 5$; $\nu = 4$ **c)** $12.82 < 13.277$, do not reject H0: B(10, p) suitable **d)** yes, $12.82 > 9.488$ so reject H0 at 5%	8
10	**a)** $\chi^2 = 29.673 > 9.488$, reject H0 **b)** 0.4825 **c)** $\nu = 3$, $2.21 < 7.815$, do not reject H0 **d)** binomial shape fits (independent, constant p) but p is about 0.48, not 0.4	10
11	**a)** $988 \div 380 = 2.6$ **b)** $\chi^2 = 6.783 < 12.592$, do not reject H0 **c)** 46.6 matches (about 47), observed 50: close	10
12	**a)** $\chi^2 = 50.867 > 21.666$, reject H0 **b)** 0 and 5: heights rounded to the nearest 5 mm (or 0.5 cm) **c)** $\chi^2 = 4.347 < 14.067$, do not reject H0	10

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Full worked solutions, written out by hand, are on the solutions sheet for this topic.

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