Pearson Edexcel

Principal Examiner Feedback

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Introduction

Calculators are expected to be used but students must also be able to write down mathematically what they are doing. Students are also advised to ensure they read the questions carefully as far too many lost marks by not answering the given question.

Report on individual questions

Question 1

This proved to be one of the more difficult questions for the students. The question tests the students' knowledge of the Poisson distribution alongside hypothesis tests which wer clearly familiar to them but their answers lacked the required detail.

Part (a) was generally well answered. The most common error was to calculate $\mathrm{P}(X = 5) \times 150$ rather than do 150 minus the sum of other expected frequencies.

In part (b) we are not looking to see if the data can be modelled by a Poisson distribution but specifically whether it can be modelled by $\mathrm{Po}(1.75)$ so this must be included in the hypotheses. Part (c) not only tested if the candidate knew how to calculate the degrees of freedom but also if they understood the reasons behind their calculation. The majority of students knew why groups were combined, although a minority did not mention in some form that it needed to be the last 3 columns which were combined. Few students were able to explain why one was subtracted. The most common reasons were because there is 1 constraint or because that is the rule rather than making reference to the fact the two totals have to agree or that the mean had been given and not estimated.

Weaker students who were not confident in how to calculate the degrees of freedom often started with the premise that there were six groups rather than 7 probably not realising the first column was for zero orchids.

In part d students had clearly been trained to recognise that the chi-squared distribution was required and were able to correctly state the value of 9.488 however, conclusions were very rarely in context, many simply referring to the data rather than the number of orchids.

Part (e) is a "show that" question and many students did not make their method clear. The working should include the distributions being used as well as the methods. Many students clearly used the binomial distribution, even though the question asked them to use an approximation. Others got 0.706 and then just went straight to the given answer with no indication that Poisson (0.706) was the distribution being used.

Question 2

This question proved to be very accessible to all students. Parts (a), (b) and (c) were generally well answered. The most common error in part (b) was to not include the distribution used to obtain the final answer and in part (c) to use the Poisson distribution rather than the binomial distribution.

In part (d) the hypotheses were generally stated with the correct parameter although a minority of students tried to write them in words. The most common errors appeared in the calculation where a common error was to use the mean of 3.7 or to calculate the $\mathrm{P}(X = 14)$. Pleasingly conclusions were generally given in context for this question.

Question 3

The majority of students were able to gain the mark for part (a).

Part (b) proved to be a challenge for all but the most able. Those who wrote down the ways in which Greg could win faired best as they were then able to attempt to find the probability in terms of *a* and *b* however, this was rarely seen. Most students tried to just write down the probability of Greg winning straight away with little success. However, they usually managed to use the fact that the total of the probabilities must equal one to gain the mark for $3a + 2b = 0.7$

In part (c) students used a mixture of possible methods. The majority of students knew the correct formula for the variance but did not check it was all in *W* or *X*. All too often they used $\mathrm{E}(X^2) - [\mathrm{E}(W)]^2$. Another common error was to try to find $\mathrm{E}(X^2)$ using $\mathrm{E}(2W - 5)$.

Question 4

It was clear from the candidate's solutions that they knew how to use a chi-squared test on a contingency table. However, the most common error was having the hypotheses the wrong way around.

The majority of students had little trouble in calculating the missing expected values but a minority did not realise that the 8.29 given in the question did not include these values and lost unnecessary marks. Others worked out $\frac{O^2}{E}$ for the 2 values and added this to the 8.29

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