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Statistics SS03

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Statistics 3

Report on the Examination

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General

Most candidates managed to attempt all questions within the allocated time and demonstrated sound knowledge of all the topics. Candidates generally remembered to quote final answers to three significant figures, and written evidence of the method used, particularly for Wilcoxon and Kruskal–Wallis test statistics and the Spearman's rank correlation coefficient, was usually given. More candidates were using graphics calculators effectively, but double checking is vital if the full method, particularly for the χ^2 test statistic, is not written down.

Marks were lost by candidates who did not explain their conclusions in the context of the question. Some candidates quoted the alternative hypothesis as 'otherwise', which is acceptable in a χ^2 test, but obviously not acceptable, or good practice, for a test that could be one tail.

Question 1

It was encouraging that many students scored highly on this question. Candidates appeared confident in evaluating Spearman's rank correlation coefficient, and only a few found the product moment correlation coefficient in error. Some candidates quoted the product moment correlation coefficient from their calculator and then also evaluated correctly Spearman's rank correlation coefficient. Marks will be lost if two solutions are offered, so candidates should ensure that they select the correct coefficient and clearly label this as their answer. The test in part (b) was carried out well by most candidates.

Question 2

Most candidates made a good effort at part (a) and found differences to rank, but some simply allocated +/– signs to the data. Some candidates were inconsistent or unclear with their hypotheses and were unable to identify the test as one-tailed. In part (b), a varied selection of comments was made, but it is the differences found that must be assumed to be symmetrically distributed. Comments such as 'specialists in France are symmetrical' or 'symmetrical salaries' did not gain marks.

Question 3

This slightly unusual scenario for a sign test was tackled well by many candidates, and the majority made a very good effort at the test. Either $\mathrm{B}(10, 0.5)$ or $\mathrm{B}(9, 0.5)$ was accepted for the model. The reason asked for in part (a)(ii) was often poorly explained. A simple comment regarding the lack of numerical data was required. Part (c) resulted in some excellent comments as well as many comments regarding the notion that teenagers may not be relied upon to tell the truth.

Question 4

Some excellent attempts were seen in part (a), and the majority of candidates showed the rankings used and managed to evaluate H correctly. Some made errors in applying the formula for H, and perhaps candidates should be encouraged to rehearse this evaluation more. The main mistakes in the conclusion to the test occurred when candidates used $\nu = 19$ instead of $\nu = 2$. In part (b), there were many intelligent and perceptive comments in the context of the question.

Question 5

Candidates seemed very comfortable with this topic and many fully correct solutions were seen in part (a). A substantial number of candidates successfully completed the workings for

the test statistic on a calculator, and some quoted p values for comparison, which is acceptable as an alternative to a comparison of ts/cv. The hypotheses were often stated the wrong way round, with 'H_0 : accident associated with age' a common error. In part (a)(iii), it was important that candidates comment on differences between expected and observed frequencies rather than referring to size of frequencies in general. In part (b), some candidates ignored the clue about pooling and lost marks. Many candidates combined parts (b)(i) and (b)(ii) and were given the marks allocated to part (b)(i) alongside those for part (b)(ii). Conclusions should always be given in the context of the question.

Question 6

The majority of candidates correctly selected a Mann–Whitney test and confidently carried out the test. Many candidates scored full marks on this final question.

Mark Ranges and Award of Grades

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