GCE
STATISTICS

SS05 Statistics 5
Report on the Examination

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General

Most students were well prepared for this examination. Working was clearly displayed in the majority of cases and students generally made good attempts at interpreting their answers in the context of the questions. In questions 2 and 3, to avoid confusion, students should ensure that the populations are clearly identified in their working; this is especially relevant when writing the null and alternative hypotheses. It is worth noting that several of the required formulae are given in the formula book and, as a result, errors cannot be condoned.

Question 1

This was an accessible question with many completely correct answers seen. Students who did not achieve full marks either made a slip in setting up $\frac{(n-1)s^2}{\sigma^2}$ or used incorrect χ^2 values. Students are recommended to quote the number of degrees of freedom they intend to use clearly and distinctly.

Question 2

This was also an accessible question with many students achieving full marks. Students needed to recognise that the variances were given and a normal test rather than a t-test was required.

Question 3

There were many successful attempts at the first two parts of this question. Part (a) required the use of an F-test to test for a difference in the variances of two populations. Part (b) required the use of a t-test to test for a difference in the means of the two populations. A few students confused the two tests but generally most were able to calculate the correct test statistic in each case.
There were some errors seen when finding the critical value for the F-test both in the degrees of freedom $(9,7)$ and then in selecting the appropriate table for the required 5% significance level.
The majority of students successfully calculated the pooled variance required for the t- test statistic in part (b) although some made unnecessary errors in the formula. Students were more successful with the critical value in this part of the question although there were again errors in the degrees of freedom (16).
The final part of the question involved some elementary calculations and then an interpretation of the result. Many students failed to realise that as the 2 samples had different numbers of plants it was necessary to find the profit per tomato plant in order to make a valid comparison.

Question 4

This proved to be the most challenging question on the paper. Most students used the correct binomial distribution $\mathrm{B}(15,0.3)$ in part (a) to calculate the probabilities and the expected frequencies even if this distribution was not specified in their null hypothesis. Most students correctly combined the classes for $x = 0, 1$ and 2 and for $x = 7$ and ≥ 8 and went on to calculate the test statistic X^2 in the correct way. The most common error was to fail to calculate the probability for $x \geq 8$ correctly and marks were lost if an inaccurate value of X^2 was obtained without clear indications of the method for $(O - E)$ and $\frac{(O-E)^2}{E}$. Many students failed to appreciate that as the value of p was known the number of degrees of freedom was 1 less than the number of classes.
Students were even less successful with (b). Some failed to realise that the test statistic had been calculated for them. The most common error was to miscalculate the number of degrees of freedom and hence use an incorrect critical value.
In part (c) students were asked to comment on their conclusions, not merely to restate them. The ideal response was to state that the number of short-sighted children in a random sample of 15 children in Year 6 could be modelled by a binomial distribution but the probability of a child in Year 6 being short-sighted was likely to be less than that of a teenager.

Question 5

This question was generally well attempted, with the majority of students gaining over half of the marks available. Part (a) using the rectangular distribution as a model was accurately answered in the majority of cases, although most students failed to realise that the answer to part (c) was simply to notice that consultations could last longer than the 8 minutes allowed by the model.
Most students understood the exponential distribution well and could calculate the probabilities in parts (i) and (iii) correctly. More errors occurred in parts (ii) and in part (iv). Those who understood the “no memory” property of the exponential distribution were more successful in part (iv) than those who attempted to calculate the conditional probability.
Part (c) asked students to make reference to their answers in part (b) and it was expected that these would be specific and numeric. There were many good responses to this part showing that students were able to interpret their numerical answers in the context of the question.

Mark Ranges and Award of Grades

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