Examiners' Report

Summer 2015

Pearson Edexcel International Advanced Level in Statistics S3 (WST03/01)

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Mathematics Unit Statistics 1

Specification WST03/01

General Introduction

The question paper proved accessible to all the students but questions 7 and 8 provided some discrimination for the top grades.

Report on Individual Questions

Question 1

Many students did not appear to have a strong grasp of the principles involved in taking a systematic sample. Whilst typically the period of 18 was identified for part (b) it was far less common to see an answer of 18 for part (a) with 720 being a fairly common error. Part (c) caused some problems too with many students failing to appreciate that a period of 18 meant it was impossible to select two adjacent names from the list.

Most students had a reasonable "stab" at part (d) and usually gained at least one of the marks. Some highlighted the need for a sampling frame as a disadvantage but this was not accepted here since the question stated quite clearly that an alphabetical list of names was available.

Question 2

Part (a) was, as expected, answered very well by most students. A small minority seemed to ignore the given rankings and coded the letters alphabetically instead. Part (b) was answered correctly by many students too but some tried using a 2-tailed test (even though there was no critical value available in the tables!) and a few still thought that the alternative hypothesis should be $\rho > 1$. The correct critical value was usually quoted (though some used the pmcc value and some the normal distribution) and a correct conclusion in context was normally present too although some thought that rejecting $\rho = 0$ meant the judges didn't agree.

Question 3

In part (a) most students showed that the value of 1.6 comes from dividing the sum of the number of accidents multiplied by the frequencies by 200 but some merely wrote down $\frac{320}{200}$ which was not sufficient. Most could find the value of r in part (b) but some simply found the expected frequency for 5 accidents (rather than 5 or more) when calculating s. In part (c) most stated the hypotheses correctly (with only a few including 1.6 here) and most could calculate the χ^2 test statistic usually after carrying out some suitable pooling of classes. The degrees of freedom and critical value were usually correct and the vast majority of students gave a suitable conclusion in context. Many simply said that the supervisor's belief was correct whilst others stated that a Poisson distribution was a suitable model but sometimes failed to mention that it was a model of the number of accidents per day.

Question 4

Although many students obtained correct answers to this question there were still a number of cases where the notation associated with the normal distribution was not handled correctly and although this is usually overlooked teachers should be encouraging their students (especially at this level) to avoid nonsense statements such as $P(D > 0.5) = 1.47$ or $P(T > 785) = \frac{785-788}{\sqrt{1.8304}}$

The main problem in part (a) was appreciating that two "tails" were required and 0.0708 was a common wrong answer. Solutions to part (b) were generally more successful but some mixed up the 0.24 and the 0.32 and a few were still confused over the difference between $30X$ and $\sum_{1}^{30} X$

Question 5

Most students gave a fully correct solution to this question. A small minority did not realise that a Chi-squared test requires frequencies, not percentages, and this was penalised quite heavily. A few did not know how to calculate the degrees of freedom, with 6 – 1 being a common error, and some failed to show their values of $\frac{(O-E)^2}{E}$ or $\frac{O^2}{E}$ despite the instruction to show their working clearly.

Question 6

Part (a) was usually answered correctly and most students were successful in calculating the test statistic in part (b) although some squared the variances and others forgot to divide the variances by 50. Some failed to give their hypotheses in terms of population parameters and others simply used μ_1 and μ_2 without explaining whether the "1" referred to the times from the morning or the afternoon. The final conclusion was usually given in context and made reference to mean time and "morning" and "afternoon". The responses to parts (c) and (d) were mixed: most realised that the Central Limit Theorem said something about the normal distribution but reference to $\overline{X}$ and $\overline{Y}$ was often missing.

Question 7

The correct mean was often given in part (a) but the variance was less often correct with a common answer of $\frac{25}{12}$ being seen from the formula for a continuous uniform distribution. Some students misunderstood the experiment described and used the mean and variance of the binomial distribution $B(40, \frac{1}{6})$. Many students could gain the first two marks in part (b), despite their incorrect variance, but a fully correct solution was usually only seen by the stronger students.

Question 8

Many students were able to make good progress in parts (a) and (b) although sometimes there was confusion over the notation for standard error with answers of $\sigma = 0.54$ rather than $\frac{\sigma}{\sqrt{n}} = 0.54$. Part (c) caught out a number of students who failed to appreciate that they were looking at the random variable Y = the number of confidence intervals containing μ and that Y had a binomial distribution. These students typically simply found 0.9^3 or occasionally tried to use a normal distribution.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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