



A-LEVEL MATHEMATICS

MS2B Statistics 2B
Report on the Examination

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General

Students generally demonstrated a high level of competence in the numerical calculations, with working frequently well set out. Disappointingly, such calculations were not always directed towards the question that had been asked, particularly in questions 2 and 8. Students must ensure that they meet the demands of the question in order to be rewarded for their efforts.

Question 1

Whilst many students found this question to be straight-forward, for others it proved to be more of a challenge than expected. Often in part (a) only the upper pdf was used leading to the solution $c = 26$. Much time was frequently wasted in part (b) with a full calculation, whereas consideration of the rectangular nature of the upper pdf allowed the answer to be written down with minimal working. In part (c), some used the upper pdf, despite having already shown that the lower pdf covered 60% of the distribution, whilst the lower limit of the correct integral was sometimes changed from 8 to 0.

Question 2

In part (a) many students did not show why $P(X = 10)$ should be 0.001, but simply completed the table for one mark. In part (b)(i) a surprising number of students chose not to find $E(\text{Prize})$ and $\text{Var}(\text{Prize})$ as asked, but calculated $E(X)$ and $\text{Var}(X)$ or $E(\text{Profit})$ or some other quantity. However accurate the calculations, credit cannot be given when they are not what the question demanded. Others did engage with the context of the question and in part (c) recognised the effect that doubling the prizes would have on Rodney's fund-raising.

Question 3

This question was generally well done, with clear null hypotheses in part (a) and accurate expected values in part (b). Many correctly calculated the test statistic in part (c). Frequently no working was shown, which was acceptable for full marks when a value of 14.2 was obtained, but any other value, however close, scored zero if unsupported by working. In part (d), where students were asked to identify a significant difference between expected and observed values, it was strange how many chose lamb and fruit salad given that for this option these two values were identical.

Question 4

Most students answered part (a)(i) correctly and many continued successfully with part (a)(ii). Others showed confusion over the top or the bottom value in part (a)(ii). Part (b)(i) proved more challenging than expected, but a pleasing proportion correctly handled the complexity of part (b)(ii).

Question 5

Many students handled well the algebra required in parts (a) and (b)(i), although some wasted time by calculating the formulae for mean and variance, which are provided in the formula booklet. In part (b)(ii), many students did not realise that 5 was less than 6.5 and it was disappointing that so many at this level were prepared to leave $\frac{4}{3}$ as the value for a probability.

Question 6

Nearly every student correctly stated that Hiran's mean value was 1.64. The initial confidence interval was usually correctly explained and the new interval calculated. The interpretation of these intervals in part (c) was not well done. Hardly any students commented that:

- with a sample mean of 1.64gpt, the chance of a population mean of over 1.85gpt was at best low
- the question was about gold mining, so even a low probability was worth further investigation as a successful site could be very profitable.

The perception that 'a 95% confidence interval was more accurate than a 90% interval' was common. A small proportion of students recognised the uncertainty of the outcome and recommended that Hiran should return for a larger sample.

Question 7

This question was generally well answered, with clearly stated hypotheses in terms of μ . Final conclusions were usually well expressed in context. Some students, however, forgot that the test concerned the mean time, whilst others were too dogmatic – 'the mean time has reduced' in part (a)(i) and 'the mean time has not reduced' in part (a)(ii). Based on the same data, these could not both be true. In part (b), many correctly identified the error.

Question 8

Part (a) was generally well answered. In part (b), frequently $f(x)$ was correctly obtained but used to calculate $E(X)$ and $\text{Var}(X)$. Since these were not part of the correct solution, no credit could be given for them. In contrast, a pleasing proportion of students worked through to a correct value for $\text{Var}(Y)$.

Mark Ranges and Award of Grades

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