A-LEVEL
STATISTICS

SS02
Report on the Examination

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General

The numerical calculations were generally well done, but explanations often showed a limited comprehension of how these related to their application. Responses suggested a difference between those who had merely learnt the theory, and others who had had practical experience, most obviously in the real data question, 2, and the sampling question, 6. As is often the case, candidates lost marks by not reading the question carefully or appreciating what a question actually asked them to do. Many responses were almost illegible and use of a pen, not pencil, and clear writing are essential to avoid marks being lost due to inability to read the response. The majority of candidates seemed to have had sufficient time to answer all the questions.

Question 1

Many candidates felt that the outliers could be totally ignored for the whole question. The features of the box plots were well interpreted, apart from the central line frequently being stated as the mean rather than the median. For those with doubts about the outliers, full marks in part (b) were available by referring to the median, quartiles and interquartile range. Candidates often exceeded the request for three comments.

Question 2

Although almost all identified the correct figure in the table for part (a), the million was often omitted. In part (b) a few candidates had no idea how to find this total, but most got the correct answer. Part (c) was quite well done, although a sizeable minority merely gave the reduced value as a percentage rather than the percentage reduction. In part (d) the correct two values were generally divided, but frequently with the wrong number of zeroes. In part (e) (i) it was disappointing to see the large number of candidates at this level who could not handle the scale of the graph. Part (e) (ii) was well done, although some used the language of regression referring to positive correlation rather than upward trend.

Question 3

In part (a) although a minority recognised that a random sample was all that must be assumed, many candidates involved “distributed normally” unnecessarily, as the sample size ensures that its mean will be normally distributed. In part (b), a pleasing proportion assembled all the elements for a correct solution: hypotheses in terms of μ, the population mean; a test statistic and a critical value calculated and compared; the null hypothesis rejected and the conclusion given in context. However, in part (c), many recalculated a test statistic and said that they had made a Type I error, while only a minority realised that the mean had indeed increased from 24, so their conclusion in (b) was correct.

Question 4

The more widespread use of calculators for the Poisson probabilities, rather than tables, has made the technical aspects of part (a) easier, but candidates still have the problem of knowing which probabilities to evaluate. In part (iii) there was much confusion over the boundary values required. Part (b) was much more challenging, and some who arrived at the correct number of doses required lost marks because they did not quote the probabilities to justify their answer, as demanded in the question.

Question 5

The majority of candidates recognised a 4-point moving average and drew a trend line. The seasonal effect and forecast were also well calculated, although some seemed unfamiliar with the term "seasonal effect". Some candidates worked in thousands, the graph scale, with no indication that this was what they were doing. In part (e) although the new moving averages were well calculated, they were often plotted in the wrong position, disguising the change in trend gradient. There was much talk of the forecast figure being "likely" to be accurate, ignoring the fact that they now knew exactly how accurate it was.

Question 6

There were some very good answers to this question, produced by candidates who seemed to have some experience of actually using the various sampling techniques. Others could merely repeat standard phrases, often in totally inappropriate places. In part (a) for instance "not an equal chance for everybody to be chosen" was a popular wrong answer. In part (b), a common misconception was that after a random number had been chosen, say 17, then every 17^{th} number must be picked. Many candidates unnecessarily renumbered the patients from 0000 to 3199. Part (c) was generally well done, although some rounded 9.2 up to 10. Answers to part (d) were hampered by the general ignorance of what a remainder was, with most candidates using their calculator and then being uncertain what to do with the $.8178125$. The majority did, however, recognise that Dr Mabuti had forgotten to say "Ignore repeats".

Question 7

Although most candidates correctly found the probability of no volunteers to be 0.12, they did not always follow through with the consequence <u>for Angus</u> of needing to do the work on his own. The mean and the standard deviation were well calculated, with only a few not showing the working for the standard deviation. In part (c) a common error was to compare the mean and the standard deviation and some did not seem to appreciate that to model a situation, the exact equality of mean and variance was not required. Some candidates seemed to think that because the number of volunteers varied, this meant "not a constant rate", forgetting the key word "average". Many, however, correctly recognised the likelihood of friends volunteering in groups, and the sudden cut off after 5. In part (d) a frequent error was to put $X = 20$ into the equation instead of $N = 20$, and others who got the equation right often could not solve it. Many did produce concise accurate solutions, although a few, despite having shown a correct table and earlier done part (b) right, seemed perplexed by the final part of the question

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