
A LEVEL STATISTICS

SS1B

Report on the Examination

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General

The majority of candidates appeared well-prepared for the topics examined although, yet again, Question 4 on probability revealed that too many candidates lacked a significant amount of the necessary basic knowledge. As in June 2014, most candidates appeared confident in answering the numerical parts of questions, usually by making use, as was expected, of their calculators' in-built statistical functions for mean, standard deviation, correlation and regression. A minority of candidates opted to use in-built functions for binomial and normal probabilities and even for confidence intervals and simply stated answers. Whilst many such candidates were successful, some lost all relevant marks for incorrect answers with no method. It was disappointing to note a small increase in the proportion of candidates not taking care in reading question instructions; marks are not available to candidates for answering their own questions! However, it was encouraging to note that stronger candidates struggled less than previously with parts of questions that required comment or interpretation.

Question 1

This first question provided the majority of candidates with a confident start to the paper. It was very rare to see incorrect answers for the mode and the median but incorrect values for one or both quartiles were slightly more in evidence. In part (b), it was much more common to see incorrect values for the mean; usually either 11.22 from the use of only x -values or, less so, 3.89 from using only f -values. Needless to say such answers scored no marks.

Question 2

Answers to part (a) were generally sound with most candidates providing adequate method. Notable errors were:

- the evaluation of $P(L > 90)$ in part (i);
- the attempted calculation of $P(L \neq 90)$ or 0 quoted in part (ii);
- the use of an area of 0 instead of 0.5 in part (iii).

Overall, answers to part (b) were much less impressive. All too often candidates used $z = +2.3263$ and then had to 'drop' the minus sign attached to their otherwise correct value for σ ; a loss of one mark. Of more concern was the significant proportion of candidates apparently unable to solve the equation $\frac{150-153}{\sigma} = (-)2.3263$ for σ ; a loss of two marks.

Question 3

It was rare to see an incorrect answer to part (a)(i) though some inaccuracies were slightly more in evidence. As expected and almost without exception, candidates used their calculators' correlation function. In answering part (a)(ii), the vast majority of candidates included the phrase 'moderate positive' or an accepted equivalent but some then lost a mark for "between papers" without making any reference to marks; a complete context was important. In part (b)(i), most candidates used correctly the formula given in the booklet provided but a very small minority omitted the square root or subtracted the two values in the denominator. Far too many candidates appeared to ignore the word 'each' in part (b)(ii) and so lost at least one mark for either making no reference to 'groups' or for comparing the two values. It was very rare to see marks scored in part (b)(iii) as most candidates based their comments on a repeated comparison of r_T and r_U ; totally ignoring the given four mean values.

Question 4

After scoring full marks in part (a)(i), less than 50% of candidates scored marks in part (a)(ii) with $0.4 \times 0.28 = 0.112$ perhaps being the most common alternative. These, and many other candidates, continued with multiplication in part (a)(iii) by attempting to compare $P(M \cap E)$ with $P(M) \times P(E)$ clearly confusing 'mutually exclusive' with 'independent'. Somewhat surprisingly, correct answers were more prevalent in part (b) with full marks not that rare. The loss of marks was usually for treating all four events as independent. Answers to part (c)(i) frequently scored both marks although many candidates gained some credit despite taking little notice of 'as briefly as possible'. It was pleasing to see the number of correct answers to part (c)(ii), even from candidates who had gained few, if any, marks in parts (a)(ii) to (b)(ii). Again the usual downfall was to treat the four events as independent.

Question 5

Most candidates scored at least five of the first seven marks through accurate plotting of points and correct use of their calculators' regression functions. The two marks lost were invariably for an inaccurate plotting of a correct line due to using guesswork for the point (\bar{x}, \bar{y}) . In part (b)(ii), many candidates scored the two marks for indicating 'each customer spends £10' which, although not strictly true, was awarded the marks. Candidates were much less sure about the reason in part (b)(ii) with many suggesting that '67.6 customers was not possible'. Whilst most candidates obtained £567.90 or thereabouts in part (c), many ignored 'to the nearest £10', and so lost the mark.

Question 6

As has become the norm, candidates generally scored highly on this binomial question. The only error of note in part (a), was to equate $1 - 0.22$ to 0.88 . In part (b), the usual errors occurred at times:

- including 20 in 'fewer than 20';
- equating 'more than 15' to '1 – fewer than 15';
- **not** equating 'at least 12 but at most 24' to '24 or fewer minus 11 or fewer'.

The main errors in part (c) were the use of $p = 0.22$ or 0.45 instead of 0.33 and, less frequently the use of $n = 40$.

Question7

Answers to part (a) showed a marked improvement on similar questions in previous series with fewer candidates standardising using $\frac{1.25-1.16}{0.43}$ instead of $\frac{1.25-1.16}{0.43/\sqrt{10}}$. Similarly in part (b)(i), a

higher proportion were able to score full marks for the use of a correct:

- z-value;
- expression for a confidence interval;
- numerical substitution therein;
- evaluation.

The key to answering part (b)(ii) was to clearly compare 1.16 with the confidence interval. A large proportion of candidates scored no marks through making no reference to a value, using 1.25 or even 0.43, or simply comparing apples and pears using qualitative judgements.

Mark Ranges and Award of Grades

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