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Mathematics MS/SS1A

(Specification 6360)

Statistics 1A

Report on the Examination

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General

This final January series' paper proved to have similar demands to those found on recent previous papers. Questions 1 to 4 proved to be a good source of marks for all but the weakest students, whereas Questions 5, 6 and particularly 7, proved to be successively more demanding.

Students of all abilities continued to be much more comfortable in answering quantitative requests than in attempting qualitative answers. Thus, when marks were lost by the stronger students, it was invariably due to an inability to demonstrate sufficient clarity in comments, explanations and conclusions. This was particularly evident in Question 7.

It was pleasing to note that most students used their calculator's in-built function accurately when calculating regression coefficients. In other calculations, most students showed sufficient working to support their numerical answers, so that when the latter were incorrect, some method marks could be awarded.

Question 1

Most students appeared well-prepared for this topic but, perhaps unknowingly, lost several marks through a lack of interpretation skills. Thus, 31, rather than 30, was a common answer to part (a), presumably as a result of the answer to part (b)(i) where 4 marks was the norm from the use of a calculator's in-built regression function. Interpretations in part (b)(ii), rarely scored 2 marks as they were restricted to 'negative correlation' (0 marks) or 'length decreases with time' (1 mark). Reference to the value of b was required for 2 marks, though in attempting this, some students lost a mark for introducing the double negative of 'decreases by -0.64'. Answers to part (b)(iii) were often correct, usually by showing that $y_{50} = -1$.

Question 2

Many students scored full marks in part (a) by correct standardisation and use of tables. When marks were lost, it was usually in part (ii) through calculating $\mathrm{P}(V < 5)$. There were many sound attempts at part (b), though the use of 1.645, instead of 1.96, and/or using v, instead of $5.028 + v$, lost at least 1 mark.

Question 3

This was another well-answered question with the use of tables resulting in full or almost full marks. Answers to part (a) were almost always correct. Students sometimes lost marks in part (b) through the use of $1 - 0.8849$ or by simply stating 0.8074 or 0.8849. Most students also scored marks in part (c) but 'at least' and 'at most' lead to the usual confusions; here between 0.9852 and 0.9680 and/or between 0.0086 and 0.0238.

Question 4

This was another good source of marks for most students. In part (a), the common acceptable answers, by various phrases, were 'checking for outliers' and 'checking for linear regression'. In part (b)(i), most students used the formula (given in the booklet) to find the correct answer to at least three significant figures. However, some students, apparently unaware of this given formula, omitted the square root or added the two values in the denominator. In part (b)(ii), interpretations, following correct work in part (b)(i), usually scored the 2 marks available. Again in part (b)(iii), most students were aware that linear scaling had no effect and so stated 'equal'.

Question 5

This fairly standard probability question posed major difficulties to the weaker students whereas the stronger students scored high marks. Almost all students answered part (a)(i) correctly with slightly fewer scoring the mark in part (a)(ii) through the use of multiplication instead of addition. The use of conditional probability to answer parts (a)(iii) and (iv) was beyond many students and it was not unusual to see repeated answers of 0.25 or 0.30. Of those students who scored very few marks in part (a), many were then able to make a sensible and often correct attempt at part (b). Whilst many students identified the need for $(0.30^2 + 0.25^2)$, this was sometimes spoilt by the introduction of 0.55, 0.55^{-1} or 2 as a multiplier.

Question 6

In part (a), those students who standardised using $0.15/\sqrt{12}$ scored at least 2 and often 4 marks. However, those who used 0.15 immediately scored no marks. In part (b)(i), a sensible substitution into $\bar{x} \pm z\dfrac{\sigma}{\sqrt{n}}$ was crucial to scoring marks. Whilst the majority of students did this very well, a significant minority used an incorrect z-value or omitted the divisor of $\sqrt{n}$. Correct deductions, usually following a correct confidence interval, were much in evidence in part (b)(ii). However stating that '4.5 was outside the interval' did not gain the 2 marks available.

Question 7

Most students had little or no idea as to how to answer this question. In answering part (a), common incorrect answers were 10 and $\sqrt{10}$ (3.16) whereas correct answers of 5 $(10/2)$ or preferably 3.33 $(10/3)$ were rarely seen. Some students scored 1 mark in part (b) for giving a reasonably clear argument as to why 391 was likely to be incorrect. However, even when part (a) was answered correctly, a valid reason as to why 95.5 was likely to be incorrect proved a step too far for most students. In part (c), most students scored 1 mark for $8210/10 = 821$ or for $10 \times 820 = 8200$. A straight comparison of 821 with 820 scored a second mark, but those students who found 8200 were required to indicate that 8210 was within 100, not 10, for this second mark. It was very disappointing in part (c) to see those students who failed to realise that it was necessary to calculate $\sqrt{\dfrac{110}{9}}$ or $\sqrt{\dfrac{110}{10}}$ in order to comment on the value of $\sum(y-\bar{y})^2$, particularly given the formula for s^2 in the booklet. All too often, they argued that $\sqrt{110} \approx 10$ which, in turn, approximately equalled their (incorrect) value of σ in part (a).

Coursework Component

The administration for this series was generally good, although one addition error in the totalling the strands was noted.

The work seen was accurately assessed in the main although individual scripts within the samples were only just within tolerance and emphasises the importance of ensuring that internal moderation procedures are robust across the full range of marks; in general it is the highest marked scripts which tend to be leniently marked.

The approaches taken to the tasks set were appropriate and enabled a full range of relevant skills to be displayed by students. There was a lack of understanding of the Central Limit Theorem in some cases which was not always reflected in the marks awarded for theory.

Please note and act upon the comments made on the feedback forms which provide guidance to teachers on the marking and administration of their coursework.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website: http://www.aqa.org.uk/over/stat.html

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator www.aqa.org.uk/umsconversion