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Principal Examiner Feedback

Summer 2016

Pearson Edexcel Level 2 Award in Statistical Methods (AST20)

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Introduction

Most students attempted all the questions on the paper so that there was no evidence to suggest that students had difficulty completing the paper in the given time. The vast majority of students completed their answers in the spaces provided.

Many students showed the intermediate steps in their calculations.

The design of this paper was consistent with previous papers and the performance of students on this paper was consistent with that expected when the paper was set so that a pass mark of about 66% of the total mark could be considered as showing proficiency in Statistical Methods at Level 2

Reports on Individual Questions

Question 1

This question was done quite well. Most students were able to score at least 1 mark for identifying the type of data for one of the examples given, where only one of the examples was correctly identified this was commonly identifying the colour of sofa as categorical. A number of students did not identify the type of data for the number of people in an office.

Question 2

This question was generally done well. Most students were able to plot the required frequency polygon. A common error was not plotting the frequencies at the midpoint of the interval; this could gain 1 mark if the plotting was consistent, frequencies correct and the points joined by line segments. Some students made mistakes when plotting one or more of the points, commonly this involved plotting a frequency of 29 at a frequency of 19. A small number of students joined their points with a curve.

Question 3

In part (a) the majority of students were able to gain the mark for a correct line of best fit. When students did not gain the mark this was due either to the omission of the line of best fit or because students joined the top left hand corner of the graph to the bottom right hand corner. Parts (b) and (c) were generally answered correctly by students. In part (d)(i) the answers outlier and anomaly were seen with approximately equal frequency; there were some errors in spelling but these were condoned. In answering the final part of the question some students did not make any reference to data from the scatter graph in their response and instead gave general advice on purchasing a van, this could not gain credit. A significant number of students made reference to the purchase price being expensive or to the fact that a much newer van could be purchased for the price, but did not

go on to indicate that Lewis should not purchase the van. A reasonable number of students were able to gain full marks for a correct reason with a decision.

Question 4

This question was done quite well. In part (a), students were generally able to calculate the probability of the dice landing on 6. Common errors in the first part of the question were to add the probabilities in the table to reach an answer of 0.89 but then not take this away from 1, or to assume that the dice was fair and give an answer of $\frac{1}{6}$. Part (b) was also done well, the most common errors observed here included finding the probability of the dice landing on 1 or 2 or 3, finding 0.66 but then dividing by 3 or working out $1-0.66$. In part (c) many students were able to calculate an estimate for the number of times that the dice will land on 2. Where students did not obtain a correct estimate this generally involved a range of different calculations which included 0.18 and 350. Part (d) proved to be more challenging for students and, whilst there were a good number of correct answers, there were also students who assumed that the dice was fair and said that it should land on 5 either 16 or 17 times and others referred to the possibility that the dice could be biased.

Question 5

This question was done reasonably well. Most students were able to gain at least 1 mark for designing a suitable question for use in the questionnaire, although some students did not include a time frame or failed to ensure that the response boxes were exhaustive or non-overlapping. In part (b)(i) the majority of students were able to identify an advantage of using a sample, although some students made comments relating to problems with the proposed sampling method instead. In part (b)(ii) students gave a range of correct answers, although a small number of students referred to problems of non-response.

Question 6

Part (a) of this question was done correctly by almost all of the students. In part (b) there was a reasonable number of fully correct answers, though a number of responses gained only 1 mark or no marks at all. Common errors involved misreading the scale used for cumulative frequency leading to incorrect plotting of the points or plotting at the midpoints of the interval. A small number of students did not attempt a cumulative frequency diagram and instead drew a frequency polygon or drew bars at the appropriate heights. In part (c) many students were able to calculate the correct interquartile range for their cumulative frequency diagram, however a number of students misread the scale on the speed axis (x-axis) when finding their values for the lower quartile and upper quartile. Some students found the median or mistakenly worked from the speed axis to find values on the cumulative frequency axis. In part (d) a reasonable number of students found the correct answer and a good number of the others gained 1 mark for drawing a line up from 45 mph or 65 mph to the cumulative frequency curve and across to the cumulative frequency axis.

Question 7

This question was done very well. The majority of students gained two marks, the most common correct response was to identify that the bar for winter was at a different angle than the others and the absence of a bar for Autumn was also commonly identified. A number of students referred to the lack of graph paper or said that the graph was hard to read, but these responses did not gain credit. Students should be encouraged to give their answers as clearly as possible when describing problems with graphs as some of the responses were too vague to gain credit.

Question 8

This question was done well by some students, but there was also a reasonable number of responses that gained part marks or 0 marks. A number of students merely totalled the frequency column and then divided by 5 (the maximum number of people), others were able to find the total number of people in the taxis as 111, but then divided by 5 rather than 45. Where students used the correct method, most were able to obtain a correct answer, but a small minority made computational errors in their calculations.

Question 9

This question was done well. The majority of students were able to complete correctly the sample space diagram. In part (b)(i) most students were able to give the correct answer. In part (b)(ii) there was also a good number of fully correct answers. A reasonably common error for the final section of this question was to give the answer $\frac{10}{12}$, which is the probability of a score less than or equal to 3 rather than the probability of a score less than 3. In both sections of part (b), a small number of students did not give their answer as a fraction, decimal or percentage as is required and instead gave a ratio or a worded likelihood.

Question 10

This question was done well. In part (a) many students were able to gain 3 marks for drawing a fully correct stem and leaf diagram with a key. Where full marks were not gained this was commonly due to the omission of the key or an incomplete key, although in a small number of instances there were errors or omissions in the leaves of the diagram. Part (b) was done well by almost all students. In part (c) there were many fully correct answers but also instances of students identifying the wrong values for their quartiles due either to finding incorrect positions for the quartiles or misreading the stem and leaf diagram. Other errors in part (c) included finding half of the range or working with differences between the median and the greatest or least values.

Question 11

The majority of students were able to identify correctly the skew of the distribution as positive, though there was a minority who thought that the skew was negative and a small number who gave numerical answers. Part (b) of the question was also done well with the majority of responses being fully correct. In part (c) most students gained both of the available marks by giving two correct comparisons. Where students did not score full marks this was often due to stating values without a comparison or comparing the least values, the lower quartiles, the upper quartiles and the

greatest values. A small number of students did not refer to the correct statistical terminology and discussed averages or the spreads of the distributions.

Question 12

This question was done well. The majority of students were able to gain full marks for a correctly completed table. When full marks was not gained this was generally due to misplacing in the table some of the data that was provided in the question, errors in calculation, or omission of the overall total.

Question 13

The majority of students were able to identify correctly the class interval that contained the median for part (a) of the question. In part (b) there was a reasonable number of fully correct answers, although a reasonably large number of students gained only part marks due to multiplication or division errors and students should show working to ensure that they gain marks even if they make arithmetical errors. Some students gained part marks for correctly obtaining 716 but then dividing by an incorrect total frequency.

Question 14

This question was done reasonably well. The majority of students gained full marks. Some students gained 1 mark for finding 10.92 but failing to realise that this needed to be rounded to give the number of swimmers specialising in the butterfly stroke in the sample. Some students gave answers which were clearly incorrect, for example 162, seemingly without realising that their answer could not be greater than 65.

Question 15

Parts (a) and (b) of this question were generally done well. In part (a) the majority of students correctly calculated the required 4-point moving average. There were a small number of students who gave a rounded answer and so gained marks for working. A few students calculated 3-point moving averages or found the average of the given moving averages. It was pleasing to see that the majority of students included clear working for their answer to part (a). In part (b) there was also a high number of fully correct answers. Where errors were observed, this was generally due to commenting on sales in a particular season or the variations in the original values rather than the moving averages.

Parts (c) and (d) were not done well. In part (c), a range of incorrect methods was seen, including omission of the ×100 and dividing the wrong way around. In part (d) some students demonstrated clear understanding of the index number that they had calculated and were able to gain the mark, others commented on an increase but did not include the required percentage. A common incorrect answer was to give the value calculated in part (c) of the question to a greater number of decimal places.

Question 16

Part (a) of the question was generally done well with the majority of students being able to gain both marks for a fully correct probability tree diagram. A minority of students did not gain full marks because they had 0.94 and 0.6 on the first branch or 0.88 and 0.22 on the second branches. Part (b)(i) of the question was also generally done well with the majority of students able to gain 2 marks. A common error was to calculate 0.94 + 0.88. Part (b)(ii) was not done well as the majority of students did not complete this part of the question correctly. A common error was to calculate the probability of one pass and one fail but forget to include the possibility of both Sam and Jes failing their exam. A number of students gave answers that were greater than 1 seemingly without realising that their probability was not possible.

Question 17

This question was not done well. Some students were able to calculate correctly the weighted mean but a large proportion of the students gave incorrect answers. Common errors included finding the mean of the two given mean weights, giving an answer of 67.3 kg or adding the two given mean weight. A number of students gave answers that were clearly incorrect for the mean weight of all of the athletes either because the mean weight was too small or too large.

Question 18

Part (a) of this question was not done well. Only a minority of students could calculate the value of $\sum x$ correctly. Common errors included $\sqrt{14560}$, $\frac{25}{24}$, $\frac{24}{25}$ and $\frac{14560}{25}$. There was also a significant number of students who did not answer this question.
Part (b) of this question was not done well. Only a minority of students gave a fully correct answer. A small number of students gained 2 marks for $\frac{14560}{25} - \left(\frac{'600'}{25}\right)^2$ while a greater number gained 1 mark for $\frac{14560}{25}$. There was a wide range of incorrect attempts at the calculation.

Summary

Based on their performance on this paper, students are offered the following advice:

- read the question fully and carefully before attempting to answer it
- show clear working to support the final answer and when necessary give a clear decision as well as the reasons
- write down probabilities as fractions, decimals or percentages and remember that a demand for a probability requires a numeric response, whilst a demand for likelihood requires a word response
- ensure that when asked to make a comparison that two or more things are actually compared

- ensure that scales are read accurately, both when plotting and when reading off values from axes
- consider whether answers are reasonable such as in the case of probability questions and questions given in context

Grade Boundaries

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