Pearson Edexcel

Examiner's Report
Principal Examiner Feedback

Summer 2018

Pearson Edexcel GCE Mathematics
In AS Further Statistics 2 paper 8FM0_24

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Introduction

Students found this first paper in the new series challenging and it was evident that not all students were fully prepared for the new topics on this specification. Whilst there were some good attempts to use mathematical models in context, understanding the conditions necessary for models to be valid were less widely known. The final question of the paper proved to be the most demanding as it required an extended line of reasoning and knowledge of logarithms from the pure math specification. Topics which require more attention by students include how to deal with tied ranks when calculating a correlation coefficient and how to use residuals to find the exact value of a point on a scatter diagram.

Report on individual questions

Question 1

Virtually all students made a good start to the paper in part (a) by being able to use the given formulae to obtain the product moment correlation coefficient. Answers should be given to at least 3 significant figure accuracy (although here 0.97 was allowed following correct working).

Part (b) was also well attempted with the majority of students being able to work out the correct gradient and intercept for the linear regression model. Here there were greater slips in accuracy for those students not using the accurate value of b when calculating a. Also, some students failed to give their regression equation in terms of the correct variables, p and m. The calculation of the residual sum of squared (RSS) was also standard and most students scored full marks in part (c).

Part (d) proved to be one of the most challenging parts of the entire paper as students did not realise that they could use the information on the residual plot to determine the exact physics score of the individual who scored 30 marks on the maths test. Most students simply opted to estimate it by using their linear regression equation, neglecting to add on the residual.

Generally students were able to give a suitable reason in part (e) as to why the point with the largest residual is removed before carrying out further analysis. The most common answer was to identify it as being an outlier. Part (f) was less successfully answered as it required both a statement about the relative size of the correlation coefficient and a correct supporting reason. Though some were able to identify that the new r would be closer to 1, many did not sufficiently justify why this was the case.

Question 2

Question 2 discriminated the most able students on this paper as it was rare to see full marks being scored here. Many students were unable to identify the distribution as (continuous) uniform in part (a). Some identified it as the normal distribution whilst others believed it to be discrete.

In part (b), some were able to gain the method mark by identifying that $P(Y < 0) = P(X < 2.5)$. It was clear that many did not know what to do with that fact. A common incorrect solution was to treat the distribution as discrete and attempt to calculate $P(X \leq 2)$.

Part (c) was generally well attempted and most demonstrated sound knowledge of $E(aX + b) = aE(X) + b$. Even those who believed the distribution to be discrete made some progress here.

Very little progress was made in part (d) as the conditional probability required was rarely seen. Those who did attempt a conditional probability often assumed independence and gave the product of two probabilities in the numerator. A few scored the special case for a correct probability for the denominator.

Question 3

This question was designed to test understanding of how to deal with tied ranks when calculating the Spearman's rank correlation coefficient. It was clear that this is one aspect of the new specification that was not well-prepared by students. In part (a), students found it difficult to apply tied ranks to the high jump results correctly. Of those who ranked accurately, no candidate reverted back to the formula for the product moment correlation coefficient using the tied ranks.

Part (b) was a standard hypothesis test for positive correlation in the ranks. Some students lost the mark by writing out their hypotheses in words, others by using r. Most went on to find the correct critical value from the tables and made a correct comparison with their calculated value from part (a). The conclusion of the hypothesis test needed to be in context for the final mark to be scored.

Part (c) was generally well attempted with a correct critical value and a correct conclusion often seen. The condition required for this test to be valid was not well known and there were not many correct responses seen in part (d). Likewise in part (e), students struggled to show they understood that the answers to parts (c) and (d) indicate that the results in high jump and long jump do not fit a positive linear pattern.

Question 4

The final question of the paper was also the most demanding. Although there were many attempts seen in part (a) where students demonstrated knowledge that $F(3) = 0$ or that $F(9) = 1$ or both, little progress was made in solving these equations simultaneously. More worrying were the students who attempted to first integrate the cumulative distribution function. Students should be aware that this specification rewards those who demonstrate the ability to draw together different areas of knowledge from across the full course of study of A level Further Maths and A level Maths. Here students needed to know how to solve a quadratic equation with the unknown value in the power. Those who persevered could score a follow through mark for a consistent value of c even when an incorrect value of n was found.

A better attempt was made at part (b), with some students using $F(q) = 0.25$ to attempt to find the value of the lower quartile. Students should check to see that their answer makes sense as some answers given were outside of the range of the x-values of the distribution.

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