Pearson

Examiners' Report

Principal Examiner Feedback

October 2018

Pearson Edexcel International A Level Mathematics

In Statistics (WST01)

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General Introduction

Most of the paper was accessible to all the students and many made very good progress on questions 1 and 2 in particular. Questions 5 and 6 were more challenging and provided good discrimination at the top end. Students are generally much better now at carrying out standard statistical calculations but interpreting and commenting on these, as was required in question 1(f) for example, is still proving a challenge to most.

Report on Individual Questions

Question 1

This question was answered well by many students. Errors in part (a) were rare but in part (b) many lost the accuracy mark because they only gave their answer correct to 2 significant figures; we always expect answers to at least 3 significant figures unless stated otherwise in the question. It was encouraging to see more students engaging with part (c) and many giving a correct response. A few thought that temperature decreased as sea level rose rather than referring to the increase in the height above sea level. There was some confusion in part (d) over the correct gradient with some attempting to find the equation of h on t but again, a good number had the correct approach with only a few losing accuracy or giving their final equation in terms of y and x. Very few though scored full marks in the final two parts. The common error was to substitute 500 for h in part (e) rather than the correct value of 5. This led some to simply comment that the model was unreliable in (f) due to their value in (e) being out of range. Few gave a correct response in (f) and realised that, because the data was collected in France, the equation was not suitable to estimate temperature in South Africa.

Question 2

This question was answered very well with nearly half of the students scoring at least 10 of the 11 marks. Part (a) was usually fully correct and most students were able to identify the correct values for c and d in part (b) although some failed to identity the outlier. The common error with the box plot was to draw the lower whisker to 24 rather than the lowest point in the data of 32. In part (d) many commented that the females were heavier on average (though some incorrectly compared means instead of medians) but few also compared the spread by referring to ranges or interquartile ranges.

Question 3

Part (a) presented the usual challenges with most students finding the correct width but far fewer managing to calculate the correct height. The idea of relating the frequency of each class to the area (in cm^2) is still not understood well by many students. The calculation of the median was usually correct but a few made errors in determining the ends of the interval. In part (c) most found the mean correctly but a number still can't find the variance and some of those who did do this successfully forgot to take the square root to find the standard deviation. Part (d) was answered well with the majority comparing their mean and median correctly. A few tried to use the quartiles (without stating the values) and provided these were correctly stated this approach was usually successful too. A number of students used a suitable formula for calculating the skewness and this was often successful. Part (e) was not answered very well. Some could find the probability that the time was greater than (or less than) 75 minutes (occasionally this was thought to be 1.15 hours) but they were often unable to complete the problem whilst others tried to use a normal distribution and made no progress.

Question 4

Part (a) was answered very well but a few incorrect answers of 0.01 were seen. Part (b) proved more challenging. Many attempted to use independence but a common error was to use $\mathrm{P}(A \cap C) = 0.04$ though most students were able to score the second method mark for using the property that the sum of their probabilities should equal 1. In part (c) some did not realise that a conditional probability was required but those who did usually obtained the correct answer. Part (d) was not answered well: a good number identified the probability of one piece of cladding having exactly 2 faults as 0.12 but did not know what to do next with 2×0.12 being a common error. Others attempted to expand $(0.04 + 0.03 + 0.05)^2$ with few doing so successfully.

Question 5

This question proved to be a good discriminator with those who had a clear understanding of cumulative distribution functions often scoring 11 or more and others often able to pick up some marks in later parts of the question. Those who knew what to do with a cumulative distribution function were usually able to find a correct distribution. Sometimes the probabilities were all in terms of *k* but most realised that F(5) = 1 and therefore $k = \frac{2}{35}$ A common error was to treat the table as a probability distribution and the value $k = \frac{2}{85}$ was often seen and could score marks in later parts of the question. Many were able to interpret the probability statement in part (b) correctly and, with follow through allowed, were able to score the marks here. The method marks in part (c) were accessible to most students and a good number had the correct values throughout this part. The error in part (d) was most unfortunate as knowledge of the modulus function is not expected for students taking this unit. Some of course did know what to do and answered this part successfully and the remainder either left the question out or had a short stab and then moved on. The marks for this part were not included in the total and grade boundaries were adjusted appropriately.

Question 6

Part (a) was answered very well by most students though the use of the notation for normal distributions is still quite poor and a few students just gave their answer as 0.9452. Most went on to complete part (b) successfully though sometimes this was quite laboured. For just 1 mark, to "show" this probability all we needed was a correct calculation possibly accompanied by a correct expression. Part (c) was not answered well. Sadly some students were confused over the nature of "scrap value" and, after calculating that there were 55 bolts in this category, subtracted the 55×1 term. Others only considered the 445 usable bolts or failed to consider the cost of making all 500 bolts. There were a sizeable number of students who simply omitted this part.

Part (d) was more familiar territory for most and one correct equation was usually seen. The second equation often had an incorrect z value of + 0.7 instead of – 0.7 Some students were using probabilities, rather than z values with 0.025 and 0.242 (or 1 – 0.242) being seen far too often. There was, as usual, a mark for solving their two linear equations in μ and σ and many students were able to clearly show how they eliminated one variable to obtain an equation (often incorrect!) in one variable. A number of students simply opted to use the facility on their calculator to solve these equations which, if the equations and answer are correct, is fine but if the equations are incorrect means that this method mark will automatically be lost too. Those who obtained the correct answers in part (d) usually gave a correct reason and conclusion in part (e) though some thought that the reduction in the standard deviation led to a decrease in profits. Those who didn't have correct values could sometimes earn these marks if they re-calculated the relevant probability or gave a suitable answer but some were hopelessly stuck as their standard deviation in pat (d) was negative. It is surprising that students do not all realise that this means an error has been made.

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