edexcel

Examiners' Report/ Principal Examiner Feedback

January 2016

Pearson Edexcel International A Level Statistics S1 (WST01/01)

Paper 01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2016
Publications Code IA043345

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Report on IAL Statistics 1

(WST01/01)

January 2016

Introduction

The paper proved to be accessible to all students with all questions having a gentle start but most having final parts that proved more challenging. Most students appeared to have been prepared on all topics but a small minority left the odd question blank, especially question 5 on the normal distribution, suggesting perhaps that their coverage of the specification had not been thorough enough.

Report on individual questions

Question 1

Part (a) caused problems for a number of students. It was quite common to see answers of 0 or 1 and a few took an average of the probabilities of 4 and 6. Parts (b) and (c) were answered well by most students. Some arithmetic slips occurred with the negative 2 and far too many students write and evaluate $-2^2 \times \frac{1}{4} \ldots$ rather than $(-2)^2 \times \frac{1}{4} \ldots$ when calculating E(X^2). A few students still confuse Var(X) with E(X^2) and others forgot to square E(X) in the final stage of their calculation despite having quoted a correct formula in a previous line. It was encouraging to see that only a very small minority were dividing a correct answer for E(X) or E(X^2) by 5. In part (d) most used the formulae for $aX + b$ correctly in the first two parts, though some opted for the longer method of writing out the probability distribution of Y. Part (iii) proved a little more challenging with some struggling to solve the linear inequality, dividing by a negative quantity meant they often had the inequality the wrong way round, and others failing to identify the correct values of X. A few students, having established that X could take the values 1 or –2, proceeded to multiply their probabilities rather than add them.

Question 2

A significant number of students had their answers to parts (a) and (b) the wrong way around. Seeing 75% mentioned in part (a), they wrote down the upper quartile without reading the question carefully enough. Part (c), however, was almost always fully correct and most could write down the top 3 marks correctly for part (d). In part (e), most identified the outlier at 5 and there were many correct answers showing the lower whisker ending at 10. Students were expected to identify from their answers to parts (c) and (d) that the convention being used in this question for the whiskers was to draw them to the largest value in the set that was not an outlier rather than to the limit for outliers. Despite this, many students drew their lower whisker to end at 6 but only lost the final mark for having inconsistent whiskers. There are still a small minority of students who lose marks for drawing two whiskers. It is important to stress to students that mark schemes are not model solutions but working documents for the benefit of examiners. Box and whisker diagrams with two whiskers are to show examiners when *either* case is acceptable but students who draw both whiskers will lose marks. The final part (f) proved very challenging. Many took the probability of the candidate who passed but did not achieve a merit to be 0.75 rather than 0.5 and this led to the common incorrect answer of $\frac{9}{64}$. Some of those who did obtain a correct product $(0.25)^2 \times 0.5$ forgot to multiply by 3 and only the most able students obtained the correct answer here.

Question 3

Most students made good progress with this question until they came to the final part. The standard calculations in part (a) were answered very well and almost all students knew how to find the correlation coefficient in part (b), but a surprising number then lost the accuracy mark because they only gave an answer to 2 significant figures. Unless otherwise stated we always look for answers to at least 3 significant figures in all questions. There were many clear and thorough answers to part (c) but some simply thought that positive (rather than strong) correlation was sufficient and a few simply stated that the correlation was close to 1 without mentioning whether or not this supported the publisher's belief. The calculations in part (d) were usually carried out correctly but again rounding errors often meant that the final equation did not have accurate enough coefficients. Part (e) was less familiar and some of the weaker students struggled to know where to begin. However, many could get started and often found a correct gradient, though far fewer were able to complete the simplification correctly to obtain the correct intercept. Part (f) proved quite challenging. Many did not appreciate that they were being asked to choose between textbooks and novels and simply said that the publisher should spend money on advertising. A few students though realised that a comparison of gradients meant that greater overall sales would be achieved by advertising textbooks rather than novels.

Question 4

There were a number of students here who only made progress in parts (a) and (e) seeming unable to use the tree diagram to answer questions stated in words. Almost all students could complete the tree diagram correctly but many of those who attempted part (b) by trying to find P(pass), missed one of the four cases. Those who used the 1 – P(fail) approach were usually more successful. In part (c), some did not identify the conditional probability and an answer of 0.85 was a common error. A few of those who did realise that a ratio of probabilities was required seemed unperturbed by their final answer being greater than 1. In part (d), some followed the lead from part (a) and drew another smaller tree diagram which helped them achieve a correct algebraic expression for P(pass) in terms of p and they were usually able to simplify to the given equation. There were some attempts to "reverse engineer" a solution but finding a convincing link to the 2.2 and 1.15 usually defeated them. Most were able to solve the quadratic equation in part (e) but there were a number of students using an incorrect formula. The main error here though was a failure to reject the solution greater than 1 which lost the final mark.

Question 5

In part (a), the vast majority of students were able to standardise correctly (a very small minority used $\sqrt{10}$ or 10^2) and most went on to obtain the correct answer though a few left their answer as 0.6554. In part (b), many were able to find P(H > 50) and P(H > 39) but the conditional probability proved a problem for some. Most used P(H > 39) as the denominator but some simply multiplied the probabilities for the numerator and others tried to use the "addition rule" but a good number obtained the correct answer. Some gave their answer as a fraction ($\frac{13}{223}$) which showed a misunderstanding about the decimals in their ratio namely that they were rounded values and so an exact fraction as an answer is not appropriate. Some calculators default to fractions and students need to be aware when a fractional answer is not suitable and, in such instances, give their answer as a rounded decimal. There were some good answers in part (c) with many making some progress. Most knew they needed to standardise with μ and σ and usually these expressions were set equal to a suitable z value. Some failed to use the percentage points table but a value of 0.84 rather than 0.8416 only lost 1 mark. A more serious error was to miss the minus sign and this would lead to both answers being incorrect. Those who had two linear equations in μ and σ were usually able to solve them and there were many correct answers seen here. Students are still not very good at looking at their answers to see if they seem "reasonable". Those who used 0.8416 rather than –0.8416 usually obtained a mean of –35.4 and a consideration of the context

would have revealed that this was impossible. Such a realisation might have enabled them to identify and correct their error.

Question 6

This question revealed that some students do not have a very though understanding of the concept of standard deviation. Almost all students could find the mean in part (a) but the standard deviation caught many out. Some simply found $\sqrt{63840}$, others attempted to "unpack" $\sum(x-\bar{x})^2$ to find $\sum x^2$ but there were often errors involved. It was encouraging to see some though who realised that $\sigma = \sqrt{\frac{\sum(x-\bar{x})^2}{n}}$ and easily achieved the 2 marks. Most were able to recover in part (b) and use the mean and median to determine positive skewness and part (c) was generally answered well suggesting that candidates have a confident understanding of the mean and the mechanics of calculating it. Many left part (d) blank or simply said that the standard deviation would increase or decrease with no attempt at giving a suitable reason. Correct answers based on a consideration of variance as the average deviation squared from the mean were rare but impressive, others were able to calculate the new value of $\sum(x-\bar{x})^2$ and hence show that the standard deviation decreased.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL