Pearson
Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2019

Pearson Edexcel GCE AS Mathematics
In Further Statistics 2 (9FM0/4B)

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

Summer 2019
Publications Code 9FM0_4B_1906_ER

Introduction

Candidates were fully prepared for the new topics on this specification. Whilst there were some good attempts to use mathematical models in context, the reasons as to why certain models are used were less well known.

Question 1

Virtually all candidates made a good start to the paper in part (a) by being able to calculate the confidence interval. The most common error was using the mean population mean rather than the sample mean. Whilst the general advice is to always give answers to at least 3 significant figures this is not always the case. Candidates should heed the required accuracy given in the question which in this case was 2 decimal places.

Part (b) was also well attempted with the majority of candidates giving a correct answer with the right reason. The most common error here was seen by the candidates who used 505 in part (a). Here they used 504 in error but were awarded the first mark in part (a) for this but did not gain the mark in part (b)

Part (c) was well answered by the majority of candidates.

It was rare to see a fully correct answer in part (d). The idea that a *t*-value rather than a *z* value and *s* instead of σ was commonly seen but the reason of the sample being small was not common. The most common reason given was that σ was unknown. However more is need as it is *n* being small which means the Central limit theorem cannot be used.

Question 2

This question was well answered with the majority of candidates gaining the marks in the first four parts.
Part (e) and (f) were less well answered.
In part (e) the main misconception was that the residuals needed to be close to zero for the model to be suitable rather than they need to be randomly scattered. A minority of candidates stated that the residuals did not add up to 1 possibly having not noticed the residual for $f = 0$

Question 3

This question was well answered with the majority of candidates gaining the marks in part (a). The main error that occurred was writing the hypotheses in terms of the wrong parameter.
Part (b) was not quite so well answered. Many candidates knew that something had to be normally distributed but few realised that it was the yield that was assumed to be normally distributed. candidates should be made aware that just saying “it must be normally distributed” will not gain the mark.

Question 4

This question was another good source of marks for the candidates with many able to gain the mark in part (a). In part (b) the majority of candidates realised that they needed to find f(x)

first and used this to find $\int_0^2 xf(x)\,dx$ in part (i). A minority of candidates ignored the demand, given in the question, to show working and use calculus and gave an incomplete method or just wrote and answer of 1.2 resulting in a loss of marks.

The demand was given as $\int_0^2 xF(x)\,dx$ also gives an answer of 1.2

In (ii) candidates who had found f(x) knew what was required and went on to find the mode correctly.

Part (b) was well answered. Candidates clearly knew the rules for identifying the type of skewness of a distribution.

Question 5

The candidates who recognised that a paired *t*-test was needed knew what to do. The errors made were usually numerical such as taking the differences as all positive or simply calculating one incorrectly. Pleasingly most candidates selected the appropriate CV for their *t* – value. The most common error was to use a difference of means test which resulted in those candidates gaining a maximum of 1 mark for the hypotheses.

Question 6

This question proved to be challenging for some. Candidates generally knew the test they needed to use but struggled to find a value for the unbiased estimator of σ. The main loss of marks for those who realised that they had been given the confidence interval for the variance was to either not show the χ^2 value they had used or not show a method at all followed by a value for *s* that was inaccurate.

The most common error was to think that the confidence interval was in fact for the mean rather than the variance. The marks they could then achieve depended on whether they had found *s* or σ

Question 7

The majority of candidates made a good attempt at part (a). Part (b) was tackled with varying degrees of success. The most common error was to use the distribution $2X + 2nW$ which led to an incorrect variance.

Others common errors included setting $\frac{252-"5.04n"}{\sqrt{"0.81n"}}$ equal to –0.8 rather than 0.8 and changing $\sqrt{0.81n}$ to $0.9n$ which resulted in a linear equation rather than a quadratic.

Question 8

Part (a) was well answered with only a minority of candidates using the critical value for the pmcc rather than for Spearman's. In part (b) it was pleasing to see that the majority of candidates showed their working clearly and attempted to give a reason for their answer. Very few candidates gave a satisfactory reason as to why *B* must be in position 7 or alternatively why *D* was in 8th although the majority did allocate the positions correctly.

In part (c) we need to see a complete explanation. The most common explanation given was that *d* would not change however this needs to be linked to the $\sum d^2$ not changing as this is what is used in the formulae.

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