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Examiners' Report

Summer 2014

Pearson Edexcel GCE in Statistics S4 (6686/01)

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Mathematics Unit Statistics 4

Specification 6686/01

General Introduction

Students found this paper accessible and scored well. They were able to make a reasonable attempt at the majority of questions. The presentation of the work was good.

Report on Individual Questions

Question 1

The majority of students gained full marks for this question.

Question 2

The definitions of a type I and type II error were usually clearly written with many students giving the exact definition given in the mark scheme.

In Q02(b) the main error was to select the critical region, $X \leq 1$ rather than $X < 2$ since $P(X \leq 2)$ is closer to 5% than $\mathrm{P}(\mathrm{X} \leq 1)$.

In Q02(c) most students were able to identify the correct probability required for a type II error following their CR in Q02(b) so gaining the method mark.

Question 3

The most able students gained full marks for this question. The most common error in Q03(a)(i) is to make an arithmetical error in finding the value of s_x^2 or use $\frac{34.11}{\sqrt{15}}$ rather than $\sqrt{\frac{34.11}{15}}$.

Q03(ii) was well answered. The main error is to use the $\chi_8^2(0.05)$ and $\chi_8^2(0.95)$ values instead of $\chi_8^2(0.025)$ and $\chi_8^2(0.975)$.

In Q03(b) many students know that they need to use $\frac{16-\mu}{\sigma}$ but do not realise they need to use the lowest value for σ from Q03(a)(ii) and the largest value for μ from Q03(a)(i).

Question 4

In Q04(a) a minority of students realised that it is the “differences” which need to be normally distributed and not the distributions themselves.

In Q04(b) the most common error was an incorrect standard deviation and not writing hypotheses which matched the units they worked in. The majority of students are able to apply the method correctly and draw a conclusion in context.

Question 5

This question was accessible to all students although only the most able were able to do Q05(e). The most common errors were to make a small error in the presentation of their solution in Q05(b) which meant it was not a fully correct solution. It is important that students get the brackets in the right place in their solutions.

In Q05(c) a minority of students gave the values to 3 decimal places rather than the 2 decimal places stated as the accuracy of the values in the table. A few students drew a straight line through the points in Q05(d).

In Q05(e) many students were able to identify the fact that the $\mathrm{P}(\text{Type II error}) \leq 0.4$ but this is where they stopped. A few students who got to a value of 0.23 got the inequality sign the wrong way round.

Question 6

Apart from Q06(a) where the majority of students were unable to explain what was meant by the sampling distribution this question was well answered. The other main errors were the use of $\frac{\sigma^2}{n}$ for the Var(X_i) and in Q06(e)(ii) many students did not refer to the bias of $\hat{\mu}_2$ being the same as $\hat{\mu}_3$

Question 7

Q07(a) was answered well with many students gaining full marks and only a minority did not state what the assumption was that they needed to make.

In Q07(b) although a pooled estimate of variance was worked out correctly by many students they then failed to use the square root of it in their calculations of t.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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