Examiners’ Report/
Principal Examiner Feedback

Summer 2010

Statistics S4 (6686)
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Introduction

Overall the paper worked well enabling nearly all candidates to demonstrate what they knew but also allowing the stronger candidates to show their true potential. Most students found Q1, Q2, Q3 and Q4 accessible with many scoring highly here.

Q5 and Q6 proved to be good discriminators and only the better candidates made significant progress through these. Generally candidates were able to carry out calculations but showed a lack of understanding when they had to use or interpret the answer to their calculations.

Report on individual questions

Question 1

This proved to be a good starter question and most candidates gave good solutions.

Part (a) was answered well with many candidates gaining full marks.

In part (b) although a pooled estimate was worked out correctly by many candidates they then failed to use the square root of it in their calculations of the confidence interval or they used $\sqrt{15}$ rather than $\sqrt{21.53 \left(\frac{1}{8} \frac{1}{7}\right)}$. A few candidates found the confidence intervals for the mean times separately rather than for the difference.

Question 2

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

In part (b) the most common error was an incorrect standard deviation. The majority of candidates were able to apply the method correctly and draw a conclusion in context.

Question 3

Many candidates were able to gain full marks in this question and even those who were unable to answer parts (a) to (c) gained several marks in the latter parts.

In part (b) a complete solution was often seen although several candidates wrote Power = $1 - P(0) - P(1)$ and then conclude that Power = $1 - (1- p)^4(1 + 4p)$ with no steps in between. This does not gain full marks.

In part (d) several candidates used the power function given in part (b) rather than find the power for the deputy’s test using the tables.
**Question 4**

The most able candidates gained full marks for this question. The most common error was in part (a) when they used \( \frac{23.04}{\sqrt{15}} \) rather than \( \sqrt{\frac{23.04}{15}} \).

Part (b) was well answered. The main error was to use 4.800 instead of 23.04.

In part (c) many candidates knew that they needed to use the highest values from parts (a) and (b) but then either did not square root the “57.3” or used \( \sqrt{57.3} \) when finding \( z \).

**Question 5**

The most able candidates gained full marks for this question. In part (b) a minority of candidates tested whether the variances of the two cars were equal rather than testing whether the variance of the Panther car was equal to 16.

**Question 6**

This question proved to be the most challenging question for many candidates. Few candidates wrote down the distributions of \( X_1, X_2 \) and \( X_3 \) in part (a) and those who tried were unable to do so accurately. The Normal and Binomial distributions were commonly seen. This aside candidates were then able to progress and gain at least two marks in part (a).

In part (b) the main error was not to use their means from part (a). Even the candidates who correctly identified the Poison introduced a variety of variances including \( \sigma^2 \).

In part (c) and (d) the candidates who knew \( \mu = \mu \) and \( \frac{\sigma^2}{n} \) gained full marks.

In part (e) the majority of candidates used \( \text{Var} \left( \frac{1}{4} \bar{Y} \right) < \text{Var} ( \hat{\lambda} ) \) although it was not always clear from their working that this was the case with many writing \( \text{Var} \left( \frac{1}{4} \bar{Y} \right) = \text{Var} ( \hat{\lambda} ) \) and simply solving the equation.
Grade Boundary Statistics

The table below gives the lowest raw marks for the award of the stated uniform marks (UMS).

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Grade A*

Grade A* is awarded at A level, but not AS to candidates cashing in from this Summer.

- For candidates cashing in for GCE Mathematics (9371), grade A* will be awarded to candidates who obtain an A grade overall (480 UMS or more) and 180 UMS or more on the total of their C3 (6665) and C4 (6666) units.
- For candidates cashing in for GCE Further Mathematics (9372), grade A* will be awarded to candidates who obtain an A grade overall (480 UMS or more) and 270 UMS or more on the total of their best three A2 units.
- For candidates cashing in for GCE Pure Mathematics (9373), grade A* will be awarded to candidates who obtain an A grade overall (480 UMS or more) and 270 UMS or more on the total of their A2 units.
- For candidates cashing in for GCE Further Mathematics (Additional) (9374), grade A* will be awarded to candidates who obtain an A grade overall (480 UMS or more) and 270 UMS or more on the total of their best three A2 units.