Examiners' Report/
Principal Examiner Feedback

Summer 2010

GCE

Statistics S3 (6691)

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Introduction

The paper seemed to work well and the standard of answers to questions using χ^2 and Spearman's rank correlation (Q4, Q5 and Q6) was very good. Most candidates now provide correct conclusions in context to hypothesis tests but some of the work on linear combinations of random variables (such as Q2 and Q3) still proves quite discriminating.

Report on individual questions

Question 1

This was a straightforward starter to the paper and many fully correct solutions were seen. The usual problems with the hypotheses were present (using $\bar{x}$ not μ, thinking μ = 80 not 83) but the calculation was often correct and a correct statement and conclusion in context usually followed. A small minority compared a z value with a probability but this error was rare at this level.

Question 2

Part (a) was often answered well with nearly all the candidates realising they needed to form a new variable such as J - P and then correctly calculating the mean and variance. Some were not sure which way round their inequality went in the resulting probability (a diagram may well have helped them) but there were a good number of correct answers seen.

The candidates' use of notation in (b) was poor with many writing $60J$ - $60P$ when their calculations implied they were using the correct formulation ($\sum J - \sum P$). Those who formed a correct distribution in (b) sometimes struggled to coordinate the units and they used 2 and 60 instead of 120 and 60 in their standardisation.

Question 3

The first two parts of this question proved quite challenging for many candidates who were unable to handle the modulus. Many simply missed the significance of the phrase "…is within…" and others misinterpreted the ranges dividing by 2. Those who did interpret the question correctly usually had few problems in calculating the required probabilities although there were some errors with the variance in part (b).

The confidence interval in part (c) was answered very well by most candidates and many correct solutions were seen. Few failed to use z = 2.3263 and only a small minority used an incorrect standard error.

Question 4

Most candidates secured full marks in part (a) with only a small number making arithmetic errors and a tiny minority failing to use ranks or using an incorrect formula.

The hypothesis test in part (b) was often answered very well too. Some did not use ρ for the hypotheses and some failed to give a full conclusion in context but most had the correct critical value and gave a correct statement about H_0 .

Question 5

For most candidates this question was a good source of marks. Hypotheses were usually correctly phrased in terms of "independence" or "association" and the calculations were usually clearly set out although some inappropriate rounding sometimes gave an answer of 3.56. The degrees of freedom and critical value caused few problems and most gave a correct conclusion in context.

Question 6

Some of the weaker candidates assumed that the expected frequencies would all equal 38 and they did not score many marks. Most though handled the unequal class widths correctly and were able to calculate a correct test statistic. Some thought the degrees of freedom should be 4 not 5 but for many candidates this was another good source of marks.

Question 7

Most candidates knew how to take a stratified sample by taking simple random samples in each stratum but they often forgot to describe how to label the members of the strata.

In (b) the commonest correct response was about the sample being more representative of the population but some missed the point and simply said that stratified sampling was "easier".

The calculation in part (c) was carried out very well by most candidates. There were few errors with the standard error and most correctly concluded that there was evidence of a difference in policy awareness between the types of staff..

In part (d) most knew that the Central Limit Theorem had something to do with the normal distribution but they did not mention that it was the mean scores of full time and part time staff that can be assumed to be normally distributed.

There were some correct responses to part (e) but many just mentioned independence despite this being given in the stem to part (c) of the question.

Most gave a correct conclusion in part (f) and some correctly inferred in the final part that the training course had been effective.

Some had the correct idea in part (g) although their conclusions went further than the evidence suggested: they claimed that the scores of the part time staff had increased, which may well be the case, but the evidence presented was only sufficient to conclude that the "gap" between policy awareness of the types of staff has been closed.

Grade Boundary Statistics

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

Module	Grade	A*	A	B	C	D	E
	Uniform marks	90	80	70	60	50	40
AS	6663 Core Mathematics C1		59	52	45	38	31
AS	6664 Core Mathematics C2		62	54	46	38	30
AS	6667 Further Pure Mathematics FP1		62	55	48	41	34
AS	6677 Mechanics M1		61	53	45	37	29
AS	6683 Statistics S1		55	48	41	35	29
AS	6689 Decision Maths D1		61	55	49	43	38
A2	6665 Core Mathematics C3	68	62	55	48	41	34
A2	6666 Core Mathematics C4	67	60	52	44	37	30
A2	6668 Further Pure Mathematics FP2	67	60	53	46	39	33
A2	6669 Further Pure Mathematics FP3	68	62	55	48	41	34
A2	6678 Mechanics M2	68	61	54	47	40	34
A2	6679 Mechanics M3	69	63	56	50	44	38
A2	6680 Mechanics M4	67	60	52	44	36	29
A2	6681 Mechanics M5	60	52	44	37	30	23
A2	6684 Statistics S2	68	62	54	46	38	31
A2	6691 Statistics S3	68	62	53	44	36	28
A2	6686 Statistics S4	68	62	54	46	38	30
A2	6690 Decision Maths D2	68	61	52	44	36	28

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.

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