A-level

MATHEMATICS

Unit Statistics 3

Report on the Examination

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General

This paper proved slightly more demanding overall than those of previous series with parts of Questions 6 and 7 providing particular challenges after Questions 1 to 5. Whilst there were some outstanding performances, there also appeared to be a significant proportion of students apparently unprepared for many, sometimes most, of the topics examined. Save for these unprepared students, most provided adequate working to supplement their good use of the supplied booklet and/or calculators. Of particular note was the variation in presentation. Whilst some students attempted to use minimum space, albeit often clearly, others used more than the space provided in such an untidy way that copying errors ensued.

Question 1

As intended, this provided few problems. Save for the very few students who chose Bishen and Chao (as their values for r were both positive) the only error of note was stating an incorrect critical value in part (b).

Question 2

Answers to this question showed a marked improvement over those to similar questions in previous series. Answers were based upon 1521, 304.2, 117 or 23.4 and only rarely did the value used for the variance not correspond. In almost all cases, a final correct adjustment was made for 'per hour'.

Question 3

It was rare indeed to see an incorrect answer to part (a). In part (b), a minority of students apparently ignored the fact that the motherboards were non-conforming whilst others used a multiplier of 3 instead of 6. In part (c), some students made errors in combining the information for factories A and C.

Question 4

Answers to part (a) were invariably correct with no student pooling the variances which would have been incorrect. Almost all students referenced the fact that zero was outside/below their confidence interval but too many then made a definitive conclusion. It was pleasing to see the large proportion of students who used a correct formula for the width, equated it to 2, and then solved their equation to determine a correct value for n.

Question 5

There were very few errors in part (a)(i) with most students finding the correct value of $\mathrm{Cov}(V,W)$. In part (a)(ii), a minority of students found $\mathrm{Var}(D)$ as $\mathrm{Var}(M) - (1 + 16 + 4)$. Correct (follow-through) working was the norm in part (b)(i) with almost all students attempting $\mathrm{P}(M > 60)$. Whilst most students realised that $\mathrm{P}(D < 0)$ was required in part (b)(ii), a small number failed to spot the link with part (a)(ii).

Question 6

Whilst there were some complete proofs in part (a)(i), usually based on first proving that $\mathrm{E}\left(X\left(X-1\right)\right)=n\left(n-1\right)p^2$, many lacked conviction with fudging not unusual. When attempted, the latter approach proved irresistible to most students in part (a)(ii). In fact no student attempted the approach of expanding the ratio $\dfrac{\mathrm{P}\left(X=x\right)}{\mathrm{P}\left(X=x-1\right)}$ and then simplifying. It was disappointing to see the number of students who did not make use of the given expression in part (a)(ii) to answer parts (b), (c) and (d). For those who did spot the link, many scored high marks. In part (c), either n large (5000) and p small (0.001) or $\mathrm{E}\left(U\right)\approx\mathrm{Var}\left(U\right)$ were acceptable justifications. Of those students answering part (d), most used the correct continuity correction.

Question 7

For those students attempting this question, most scored at least 4 marks in part (a). The lost marks were for evaluating $1-\mathrm{P}\left(X\leq10\right)$. In part (b)(i), far too many students used $\dfrac{90}{300}=0.3$ instead of 0.25 in their test statistic. Under H_0, p, rather than $\hat{p}$, is the correct value. In answering part (b)(ii), where the answer was given, students were required to evaluate the critical value to at least four decimal places. Simply stating that an expression, even when correct, equalled 0.291 was not sufficient for 2 marks. Those students who persevered to part (b)(iii), usually had a firm knowledge of the power of a test and many were able to determine its value correctly for the given context.

Mark Ranges and Award of Grades

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UMS conversion calculator www.aqa.org.uk/umsconversion