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Examiners' Report/ Principal Examiner Feedback

Summer 2013

GCE Further Pure Mathematics FP1 (6667) Paper 01R

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Further Pure Mathematics FP1 (6667R)

Introduction

This paper was more accessible to most candidates and the great majority were able to make some attempt at all questions. Calculus techniques when required were well understood and, in general, the standard of presentation was satisfactory. The majority of candidates used calculators appropriately, but problems arose when candidates gave exact answers to some questions derived from calculators without any working to support them. The rubric on the front of the paper advises candidates that they should show sufficient working to make your methods clear to the examiner.

Report on individual questions

Question 1
This was a good opening question for the candidates and solutions were almost always correct. They demonstrated that they knew how to deal with real and imaginary parts when subtracting and multiplying very well.

Question 2

A surprisingly high proportion made errors in part (a) either by multiplying by 3**I** rather than adding or adding a matrix similar to the identity, but with the 0s and 1s swapped. A majority of candidates found the determinant correctly in part (b), but the most common error seen was then equating det**B** to 1 rather than 0. This final part was the trickiest demand with many candidates failing to realise that the matrix **E** was of order 3x3. However, when they did get the correct dimensions, they generally calculated it accurately and scored all marks.

Question 3

In part (a) nearly all responses seen demonstrated the sign change in $f(x)$, but some candidates failed to make a satisfactory conclusion and lost the accuracy mark. Part (b) was a problem for some and a few tried linear interpolation rather than interval bisection. There were a few candidates that used interval bisection correctly, but unfortunately gave the wrong interval as their final answer. The Newton-Raphson method in part (c) was correctly applied in many solutions. The differentiation was usually done well, but there was the occasional slip. A number of responses did not contain much evidence of the calculations involved and some candidates used 1.5 instead of -1.5. This was not a problem where answers were correct, but a lack of working did cost some candidates marks where the final answer was incorrect.

Question 4

Generally both parts of this question were done very well. Errors that candidates made included $\pm\frac{3}{2}$ rather than $\pm\frac{3i}{2}$ or use of an incorrect quadratic formula. Almost all the candidates were able to plot their solutions on a correct Argand diagram.

Question 5

Most candidates were able to make correct substitutions in part (a) and rearrange to obtain the correct quadratic in t. Some candidates obtained equations in x or y first, but usually worked through to the given answer with valid working. The majority of candidates reached the desired formula by convincing methods and only small mathematical slips led to them dropping the final accuracy mark. In part (b) the responses typically showed valid attempts to solve the quadratic to obtain correct coordinates.

Question 6

A most common error in part (a) was to find **P** as **BA** instead of **AB,** but candidates were awarded follow through marks in the later parts of the question. The value of the determinant was usually correct, and most knew that this helped to find the area, but some candidates multiplied by their determinant in part (b) rather than dividing. In part (c) a few candidates failed to realise that $\mathbf{P}^{-1}$ was being asked for, but many were able to find the inverse correctly from their answer to part (a).

Question 7

Many of the candidates were well rehearsed for this question and the majority were able to show that the equation of the tangent was as stated in part (a) and in part (b) the vast majority of answers were correct. In part (c) many candidates found the gradient of PQ again, but some candidates just quoted the equation. This part of the question was usually correct, however some of the responses lacked a conclusion.

Question 8

A large number of candidates knew induction well and picked up most of the marks in this question, though there was a reluctance to take out the factor (k+1) early. A common error was to show it was true for n=1, but then just substitute k+1 into the formula instead of adding the $(k+1)^{\text{th}}$ term to S_k. A significant number of candidates failed to identify the (k+1) in each bracket following them finding the correct factors. A minority scored no marks by trying to prove by use of the standard summation formulae from the formula book. In part (b) those who used their answer to part (a) generally did so correctly, but a minority did not correctly follow their answer to part (a). An occasional error was to write $3S_n$ - S_n instead of $S_{3n} – S_n$.

Question 9

Part (a) was usually answered correctly and in part (b) the argument was generally correct, but a minority gave the positive argument by mistake. In part (c) a variety of methods were used to find z. Most candidates were successful, but some had no clear method to account for the two complex numbers when solving. In part (d) many candidates found the value of λ correctly, most of these through the use of trigonometry rather than by equating real and imaginary parts directly.

Question 10

Part (a) was usually correct showing that candidates were able to make correct use of the standard formulae. Part (b) proved to be demanding even for some of the best candidates. Many could not deal with the lower limit of 0 correctly and therefore failed to get an answer in the form given. Not enough candidates realised they did not have, and could not have, a factor of $(n+1)$ from their incorrect opening statement.

Grade Boundaries

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