Qualification Accredited

OCR
Oxford Cambridge and RSA

AS/A LEVEL GCE

Examiners' report

MATHEMATICS (MEI)

3895-3898, 7895-7898

4753/02 Summer 2018 series

Moderated component

Version 1

Contents

Introduction

The coursework component of Core 3: Methods for Advanced Mathematics 4753 aimed to develop an appreciation of the principles of numerical methods and at the same time be provided with useful equation solving techniques. The intention of this activity was not merely to solve equations; candidates were encouraged to treat it as an investigation and to choose their own equations.

The objectives were:

- that candidates should be able to solve equations efficiently, to any required level of accuracy, using numerical methods;
- that in doing so they will appreciate how to use appropriate technology, such as calculators and computers, as a mathematical tool and have an awareness of its limitations;
- that they show geometrical awareness of the processes involved.

OCR hopes that you and your candidates have enjoyed working through the coursework task. Although not part of the reformed A Level assessment structure, you may find this task a useful teaching and learning activity when covering the Numerical Methods content under DfE criteria reference I1 and I2. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516949/GCE_AS_and_A_level_subject_content_for_mathematics_with_appendices.pdf

Resitting Core 3

This was the final year of the unitised A Level Maths qualification 7895. There is a resit series in 2019 for those candidates that have certificated 7895 in a previous year. Those candidates that wish to resit 4753 may choose to carry over their coursework mark and only sit the examination paper, or to undertake a new coursework task and sit the examination paper (it is not possible to only complete a new coursework task and carry over the previous examination mark).

The entry code 4753B should be used for those candidates that wish to carry over their coursework task.

The entry code 4753A should be used for those candidates that wish to complete a new coursework task. Please note that these candidates are not permitted simply to improve a previous, marked, piece of work; they must undertake a new coursework task.

Administration

It was pleasing to note that moderators reported that most centres had administered the coursework efficiently, meaning that marks were submitted on time and the sample request dealt with speedily. This all made the process of external moderation very much easier.

In a very small number of instances, marks were not submitted until many days after the deadline set by OCR and the sample sent very late. This causes pressure on moderators who have less time to do their work. There were few clerical errors, and inconsistent marking resulting in an invalid order of merit occurred only in a handful of centres.

The major problem for moderators is caused when assessors tick work that has not been checked and in a number of cases credit was being given for incorrect work.

The marks of candidates in most centres were appropriate and acknowledgement is made of the amount of work that this involves to mark and internally moderate. The component specific comments are offered for the sake of centres who have had their marks adjusted for some reason. Centres should note that having marks adjusted does not imply inconsistent marking, merely that the level has been misjudged.

Common issues

The mark scheme for this component is very prescriptive. However, there are a significant number of centres where so many of the points outlined below are not being penalised appropriately that the mark submitted is too generous.

The following points should typically be penalised by half a mark.

Change of Sign

- A graph of the function being used does not constitute an illustration of the method. The graph should be very carefully annotated or at least two "zoom-in" graphs should serve to illustrate the method. Candidates could be encouraged to draw a "zoomed in" graph for every scale of x that they use.
- Graphs which candidates claim crosses the axis or just touch but do not should be checked. A clue is the scale on the y-axis. A scale that goes from 0 to 10, for instance, could show that the graph just touches the x-axis but in fact does not. The case of there being two roots very close together does not negate the demonstration of failure, but the graph that does not quite touch actually means that there is no root to find. In this case, candidates cannot claim that the method has failed.
- The root is given as an interval rather than an actual value with error bounds.
- Through a process of rounding, it is possible to give error bounds which do not encompass the root.
- If a table of values actually finds the root then the method has not failed.

Newton-Raphson

- Candidates who use equations with only one root should not be credited the second mark.
- Iterates should be given for success and failure.
- A print out from "Autograph" is not sufficient. Candidates should derive the formula by differentiation and algebra. This should be for the equation being used rather than theory.
- Poor illustrations (for example, an "Autograph" generated tangent with no annotation or just a single tangent) should not be credited the full mark.
- Iterates should match the graph used to demonstrate the method.
- Error bounds should be established by a change of sign.
- Failure should be demonstrated "despite a starting value close to the root". If the starting value is too far away from the root or too artificial then the mark should not be credited.
- The roots in this domain should be given to 5 significant figures. Teachers should note that the default position of "Autograph" is only 4 significant figures so candidates need to make some adjustment before the use of the software is satisfactory.

Rearrangement

- Incorrect rearrangements are often not spotted and marked as correct.
- The method should be explained by a graph, which may need to be annotated.
- Weak discussions of g′(x) are often given. Candidates should not just quote the criterion without linking it to their function.
- The criterion states that candidates should use a rearrangement of the same equation to demonstrate failure. This might mean using the same rearrangement to try to find a different root or a different rearrangement to try to find a different or the same root.

Comparison

- The methods need to be compared by finding the same root of the same equation with the same starting value to the same degree of accuracy.
- The discussions are often thin and omit references to the software actually being used.

Notation

- Equations, functions, expressions still cause confusion to candidates. Candidates who assert that they are going to solve y = x3 + x + 7 or that they are going to solve x3 + x + 7 should be penalised.

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For further details of this qualification please visit the subject webpage.

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If any of your students' results are not as expected, you may wish to consider one of our review of results services. For full information about the options available visit the OCR website. If university places are at stake you may wish to consider priority service 2 reviews of marking which have an earlier deadline to ensure your reviews are processed in time for university applications.

activeresults

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