

GCE MATHEMATICS

MD02 Decision 2
Report on the Examination

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General

Most students were well prepared for the exam and many outstanding scripts were seen. Students were well-drilled with the familiar algorithms. However questions that were set in a different style to the 'norm' proved to be challenging, especially question 4 where many students failed to realise which algorithm was required. The majority of scripts were very well presented; this is essential when examiners have to check each step of an algorithm.

Question 1

The first three parts of this question proved to be a good source of marks for all students with many scoring full marks. There were problems in part (d), where students failed to appreciate the effect of BOTH H and K overrunning and the implications to the critical path.

Question 2

Although many students scored the majority of marks on this question, full marks were rarely seen. Errors were common in answers to parts (e) and (f).

Question 3

The majority of students were able to apply the Hungarian algorithm correctly and many students scored full marks. Students should be encouraged to produce a new matrix at each stage of the algorithm and not merely cross-out values and over-write with new values on one matrix, as this makes the examiners task of checking earlier values almost impossible. To gain full marks, students needed to justify continuing with augmentation and later confirming that they had found an optimum solution. Students should be encouraged to write short statements such as 'all zero's covered with four lines, therefore not optimal' at the appropriate point in their solution. Some students lost a mark by trying to find a third matching corresponding to the maximum value found.

Question 4

This question proved to be a challenge for the students who were required to identify the problem as a maximin. Students who recognized the problem normally scored full marks but, unfortunately, many students thought that the problem was maximizing, or in some cases a minimax problem.

Question 5

In parts (a) and (b), the majority of students had an idea of the requirements of this question, but full marks were rare. It is essential that students give full and clear statements to convince an examiner; simply writing down 6 numbers, circling two of the numbers, then stating ' $1 \neq 2$ ' will not score full marks. Part (c) was well answered, although some students lost the mark through a lack of clarity in their statement.

Part (d)(i) was poorly answered. Although students realized that the question was concerned with changing signs, the explanations given were poor and showed a lack of understanding of the problem. Many students scored full marks on the final 2 parts. Errors occurred when students failed to draw accurate graphs and consequently failed to identify the correct maximum point.

Question 6

(a) A number of students failed to score the marks in this part as they simply converted the inequalities into equations. (b) Despite reference to the requirements for this question in previous examiners reports, many students failed to justify the pivot chosen. (c) Again, many students failed to justify their choice of pivot. This should be done as a matter of course in any Simplex question, and many students failed to either justify or state the pivot that they were using. (ii) Although many students arrived at a correct final tableau, a significant number failed to state that an optimum solution had been obtained and, also, failed to give the values of x , y and z .

Question 7

Although many students answered this part correctly, there was a significant number who included values on their edges that corresponded to the initial flow. In part (b), a large number of students started from a 'zero-flow' and then augmented to arrive at the given flow and then stopped. In (b)(i), although there were many correct solutions, a significant number of students failed to give a convincing solution on their diagram. It is essential that students use 'backward' arrows to show existing flows and 'forward' arrows to show potential flows. There were a significant number of students who scored 5 marks in part (b)(i) but failed to score both marks part (ii). Part (c) was poorly answered. Students were asked to list the edges of their cut, many simply drew a cut on their diagram.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.

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Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

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