A-LEVEL

Mathematics

MD02 – Decision 2

Report on the Examination

6360

2014

Version: 1.0

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 questions 3, 5 and 8 where many students failed to realise the requirements of the question.

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 realise the effect that H was critical.

Question 2

The majority of students understood the requirements of this question, but full marks was the exception, not the norm.

It is essential that students give full and clear statements to convince an examiner; simply writing down 7 numbers, circling two of the numbers, then stating '$0=0$' did not score full marks.

Some students attempted part (a) by dominance, often giving complete answers.

Students struggled in part (b) to distinguish between the saddle point and the value of the point.

Question 3

(a) Correct answers were in the minority. Students were unsure as to which edges should be included in evaluating the cuts.

(b) Although many students answered this part correctly, there was a significant number who included values that exceeded the maximum shown on the original diagram eg $DE = 15$.

(c)(i) A large number of students started from a 'zero-flow' and then augmented this to arrive at the correct maximum, but the majority of students attempted this part by inspection. Correct answers were in the minority.

(ii) This part was poorly answered. Many students simply stated 'maximum flow = minimum cut' without referring to this specific question. The majority of students who tried to find the minimum cut looked at their answer to part (i) to find a cut, rather than considering the original diagram with edge EH missing.

Question 4

(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 taught as a matter of course in any Simplex question, yet 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 the slack variables.

Question 5

(a) This part was well answered.

(b) This part was a challenge to all but the best students. Many students failed to cope with a reduced matrix and others, who tried to give expressions for the three strategies, failed to have a system where their sum was 1.

Students who used p, q and $1 - p - q$ often went on to score full marks.

Question 6

This question proved to be a good source of marks for nearly all of the students, although full marks were rare.

Many students lost a mark by only having one value from B to A.

Some students thought that this problem was a minimax problem.

Question 7

(a) Nearly all students followed the lead given and scored full marks in this part.

(b) The majority of students were able to apply the Hungarian algorithm correctly, and many students scored full marks.

Students must 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.

Students needed to justify that they had found an optimum solution to gain full marks. Students should be encouraged to write short statements such as ‘all zero’s covered with four lines, therefore optimal’ at the appropriate point in their solution.

Question 8

(a), (b) Many students scored full marks. The main error was in finding the value of y.

(c) This part was poorly answered and full marks were very rare. The simplest way to tackle a question of this form is to reduce the three activities to their minimum, find the new critical path and then increase activities so that each new float time is zero.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

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

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