AQA
Questions matter

AS

Further Mathematics

7366/2D Paper 2 Discrete

Report on the Examination

7366
June 2024

Version: 1.0

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Question 1

The vast majority of students recognised the correct response for Euler's formula for connected planar graphs.

Question 2

As with Question 1, the vast majority of students selected the correct response, with some students reasoning the answer with a simple diagram.

Question 3

Again, the vast majority of students selected the correct response, often noting the degree of each vertex on the diagrams to ensure their response was correct.

Question 4

In part (a), just under 90% of students provided a fully correct Cayley table for the set. Where mistakes were made, it was often due to not applying the modulo 5 condition or using addition modulo 5 instead.

Nearly all students stated the correct identity element in part (b).

In part (c), just over half of students were awarded the single mark available. Where the mark was not awarded, it was often for omitting one of the two self-inverse elements.

Question 5

The vast majority of students received all 3 marks in part (a). A common mistake was to include the arc *AB* in the spanning tree instead of the arc *BC*, which often led to the award of 2 of the 3 available marks.

Many students benefitted from the follow-through mark in part (b), so that erroneous inclusion of the arc *AB* could still achieve the single mark in part (b).

Question 6

Around a quarter of students received all 4 marks in this question. By far the most common reasons for not awarding all marks were for not fully defining the variables being used, omitting or making errors with one or more of the inequalities, or failing to state that the two introduced variables must be integers.

Question 7

In part (a), around a third of students were awarded both marks, with over three-quarters of students being awarded at least one mark. Most students knew the relationship for the commutativity of a binary operation, but most of these students did not complete a reasoned argument to conclude that this binary operation was commutative, often due to poor notation.

Perhaps surprisingly, students fared better in part (b) with just under half of all students being awarded all 3 of the available marks. Most students could write down the two relevant expressions for a test of associativity, and then correctly find at least one of these expressions fully expanded. The final mark was often not awarded because students did not give a full proof with correct notation and a concluding statement.

Question 8

About three-quarters of students were awarded all 3 marks in part (a). If they considered the initial feasible flow leaving the source *S* and equated this to the initial feasible flow entering the sink *T*, they typically went on to receive the 3 marks, barring the odd numerical or algebraic error.

Over 90% of students were awarded the single mark in parts (b)(i) and (b)(ii).

In part (c), just over half of students identified the cut with a value of 27. However, very few of these students then went on to give a correct statement with direct reference to the maximum-flow minimum-cut theorem, with the most common error being a definitive statement that the maximum flow was 27 based only on the consideration of this one cut.

Question 9

Over three-quarters of students received all 4 of the available marks in part (a). Most diagrams were very good, with the use of a ruler becoming more prevalent than in previous series to give the clearest solutions. Where mistakes were made, they were typically not for incorrect connections, but for incorrect earliest start times and latest finish times, mostly due to numerical errors.

In part (b), the vast majority of students were awarded at least 1 mark, but very few were awarded both marks. The idea of there being ambiguity in Robert's situation eluded many students who did not receive the second mark, having given either an invalid reason or no reason at all.

Question 10

In part (a), there was a spread of marks. Many students could identify at least 4 of the 6 row minima and column maxima. About one-third of students identified –1 or x as being the max(row minima) and the min(column maxima), but then very few students went on to reason why $x = -1$ is the **only** possible value for x if a stable solution is to exist.

In part (b), about two-thirds of students correctly stated the value of the game for Bilal.

Mark Ranges and Award of Grades

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