UG Exam Performance Feedback
First Year
2018/2019 Semester 2

COMP11120 Mathematical Techniques for Computer Science

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Comments

Question 1

Q1a) Step case was generally well done. For the base case it was very common to start from n=1, but the question asks for all natural numbers. Missing justifications was a common cause of lost marks.

Q1bi) Base case done well, in step case some answers evaluate to a list (e.g. 0:m for some list m) or just evaluate to 0 if the first value is not the one sought, without using recursion.

Q1bii) Mostly done very well. Some answers miss the need for the method to call itself recursively. It was quite common for the code not to match the mathematical definition, or for these not to match the properties actually used in the following induction proof. In this case one of the versions was generally correct, and students would have benefited from comparing their answers for parts (i)-(iii) and resolving discrepancies.

Q1biii) Generally done well, including by students who struggled with part (i). A few students gave only an intuitive answer. This is not a proof that the operations recursively defined have the property, unless you first prove all the intuitive claims you need to make about them.

Q1c) Most struggled with this question. Many students said there should be a bijection with the natural numbers, but this is the definition of *countably* infinite. Some students have a definition of infinite involving producing a "new" element, something which is not defined. A few students seemed to misread the question, and answered whether A was finite or infinite, rather than the set of lists over A.

Question 2

The average for Question 2 was 57.5%. 22 students had a failing mark. 71 students had a first class mark, of which 13 students achieved at least 18 marks (the best mark was 19).

Q2a) This question was generally well-answered, except for ii), where many got the correct answer but often a mark was lost for not giving an explicit counter-example. Many did not give the equivalence class for 101 of the first relation or made mistakes in writing it down or describing it only abstractly (all the elements of [101] needed to be explicitly given).

Q2b) Again generally answered well. Common mistakes included:
- closing under symmetry in i)
- in ii) drawing the Hasse diagram up-side down; including horizontal lines in the Hasse diagram, including the link (a,d)
- mixing up minimal and least/maximal and greatest elements; not realising there can me more than one greatest element

Q2c) This was the hardest part of question 2, but 1 students achieved full marks. Most students got partial marks for i). In ii) a non-trivial relation needed to be given, this excludes a property of a partial order, because this was stated in the question.

Q2d) This question required ability to perform modular multiplication and know what a multiplicative inverse is. The question was either answered well or not at all or poorly.

Question 3

The average for Question 3 was 71.0%. 3 students had a failing mark. 129 students had a first class mark, of which 38 students achieved at least 18 marks (the best mark of 20 was achieved by 7 students).

Q3a) These true/false questions were answered generally well. Most got the answers right. Most marks were lost due to insufficient explanations or mistakes in the explanations/arguments. Part iv) proved to be the hardest question.

Q3b) Answers to i) were most good, but some did not realise u is a vector, and made mistakes in the indices of the entries (m instead of n or vice-versa). In part ii) some did not notice that the average over the *column* of matrix A (note the italics font used in the question). This meant that i) could not be used directly but gave sufficient hint to work out the correct answer.

Q3c) Generally the question was answered well and most got full marks. Marks were lost due to: not writing down the standard matrix for the composition for i), computing it by multiplying the matrices of T and T' in the wrong order, or mistakes in the calculations.

Q3d) This question required GE elimination to be used to solve the given system and treat k like a scalar/real number in the process. This was done reasonably well for the reduction of the augmented matrix to (R)REF. In the backward elimination phase when mapping rows back to equations some care was needed and most mistakes occurred. The question did not specify that our GE algorithm needed to be used, so finding the answers by other ways could also achieve full marks.