

Exam Performance Feedback

COMP34120—Questions 1 and 2

2012/2013

The following only concerns Questions 1 and 2 of this exam.

It should be pointed out that the exam mark is not the final mark for this course unit. The final mark is calculated by applying a factor of .4 to the exam mark (taken out of 100), multiplying each of the coursework marks with .3, and adding the three together. General remarks: 35 students answered questions from this part.

Question 1. This question had a higher average than in the past, with 10 out of 20. However, there were a lot of answers with very low marks. Of the 34 students attempting it 13 received a mark of 7 or lower (that is a failing grade) while 8 managed a first class mark. One student managed to get the full 20 marks, while the lowest mark was 1. Students who had marks of five or lower wrote down very little that was both relevant and true.

- a) To find pure strategy equilibrium points all one has to do is find entries which are maximal in their column and minimal in their row. Most students could carry out this simple task correctly, but some of them forgot to note the value as required, losing a mark. Some students didn't find all the pure strategy equilibrium points, or gave wrong answers. An example of this question can be found in Exercise 16 of the notes.
- b) Most students realized that the given game has no pure strategy equilibrium points, which netted one mark. A matrix just like this one is solved in Jon Shapiro's 'worked examples' as Example 1. Some students were able to carry out the calculations (not asked, but got full marks), and some others could describe parts of the calculation required, but very few could state more than one correct step. Although I marked this quite generously, the average mark for this question was low.
- c) There is a lot of symmetry in this game, since all three players are in the same situation. There are 27 strategy combinations (buy no ticket, or buy a \$15, or a \$30 ticket for each player), and some students wrote out pay-offs for all 27, which is not needed to solve the game since there are only 10 fundamentally different situation. Moreover, one can argue without doing these calculation that the 'buy a \$30 ticket' is dominated by the 'buy no ticket' strategy. Removing that option by domi results in only 4 fundamentally different scenarios, and out of those 6 give equilibrium points. Quite a few students got at least most of the way to the solution. Using dominance is given in Sections 2.6 and 2.7 of the notes (but it is possible to solve this one without using dominance), and finding equilibria for games with three players is demonstrated in Exercise 14 of the notes. Some students failed to read the rules of the game correctly (the prize money is fixed at \$30), or calculated the various pay-offs incorrectly for other reasons, or just couldn't find the equilibria.
- d) The value of a game is defined in Definition 9 of the notes. It is *only* defined for 2-person zero-sum games (otherwise one cannot try to summarize a game with just one number). Alternative definitions come from Propositions 2.8 and 2.11 A surprising number of students could not correctly restrict the situation, or gave definitions that were at best partially correct.

Question 2. This question was attempted by 35 students. The average mark was 10 out of 20. Ten students got a failing mark and eight managed a first class answer.

- a) The minimax algorithm calculates the value of 2-person zero-sum game, as well as a strategy for either player for achieving it (students who did not mention the strategy or the value lost one mark, but only one mark, out of the eight). This is described in Section 3.1 of the notes. If the game is not zero-sum then it calculates (for either player) the maximum amount the player can guarantee for himself (see Exercise 22 for an example), plus a strategy for achieving that. The algorithm can be adjusted to arbitrary number of players by minimizing on a move when it's not the current player's turn, and it still calculates the same number and a strategy for achieving that for each player. There were a lot of incorrect statements regarding what the various versions of the algorithm calculate.
- b) This was quite well answered overall. What is wanted here is a summary of Section 3.2. However, some descriptions as to the meaning of the two values, and how they are used, were incorrect.
- c) I was looking for a summary similar to that on page 72 of the notes regarding what happens when the game tree cannot be searched in its entirety. Students who only mentioned that one can build the game tree on demand without keeping it in memory received some marks, but if they did not go on to say what happens when the algorithm cannot reach the leaves they lost marks. To my surprise some students did not try to answer this at all, despite the fact that all groups implemented this kind of program as part of the first group project.
- d) Examples are described in Section 4.4 of the notes, but I also accepted additional variations that don't appear in the notes but were researched by students for their group project. By and large this was well answered. However, some students offered no answer at all here.