

CSI 35, Homework 12 on sections 11.2, 11.3

Due by Wed, Dec 7.

Here are 6 questions for you to try with some from the book. Write all your working out and answers on your own notepaper. Please use lots of space. It is very important that you show clearly any work you had to do to get your answers.

The first two questions are about the game of *nim*. As we discussed in class, the player taking the last pebble wins. The textbook on page 766 discusses a different variation where the player taking the last pebble loses, so don't use that. (We are following the standard rule in game theory where the first player unable to make a legal move loses.)

- (1) Take the game of nim starting with one pile of 3 stones.
 - (a) Draw the game tree. (It should have 8 vertices.)
 - (b) Starting with the leaves, label all the vertices with +1 for winning positions for player 1 and -1 for winning positions for player 2.
 - (c) Does the first or second player have a winning strategy for this game?
 - (d) If the first player has a winning strategy, what is the winning first move?
 - (2) Take the game of nim starting with three piles each containing 2 stones, 1 stone and 1 stone.
 - (a) Draw the game tree. (It should have 18 vertices.)
 - (b) Label all the vertices with +1 or -1.
 - (c) Does the first or second player have a winning strategy for this game?
 - (d) If the first player has a winning strategy, what is the winning first move?
 - (3) Page 783, Question 2
 - (4) Page 783, Question 10
 - (5) Page 784, Question 16
 - (6) Page 784, Question 23 parts (a), (b), (c) only
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If you understand the homework questions then you will be able to do the exam questions. You can also try the other questions listed on the syllabus to get extra practice. For any difficulties with the homework, please email me, come to my office hours or try the Math Tutoring Lab.