# ECON 121: Problem Set #11

Due on Jun 16, 2025

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# Problem 1

Centipedes: Imagine a two player game that proceeds as follows. A pot of money is created with $6 in it initially. Player 1 moves first, then player 2, then player 1 again and finally player 2 again. At each player's turn to move, he has two possible actions: grab (G) or share (S). If he grabs, he gets 23 of the current pot of money, the other player gets 1/3 of the pot and the game ends. If he shares then the size of the current pot is multiplied by 3/2 and the next player gets to move. At the last stage in which player 2 moves, if he chooses share then the pot is still multiplied by 3/2 , player 2 gets 1/3 of the pot and player 1 gets 2/3 of the pot.

(a) Model this as an extensive form game tree. Is it a game of perfext or imperfect information?

(b) How many terminal nodes does the game have? How many information sets?

(c) How many pure stategies does each player have?

(d) Find the Nash equilibria of this game. How many outcomes can be supported in equilibrium?

(e) Now imagin that at the last stage in which player 2 move, if he chooses to share then the pot is qually split among the players. Does your answer to part (d) above change?
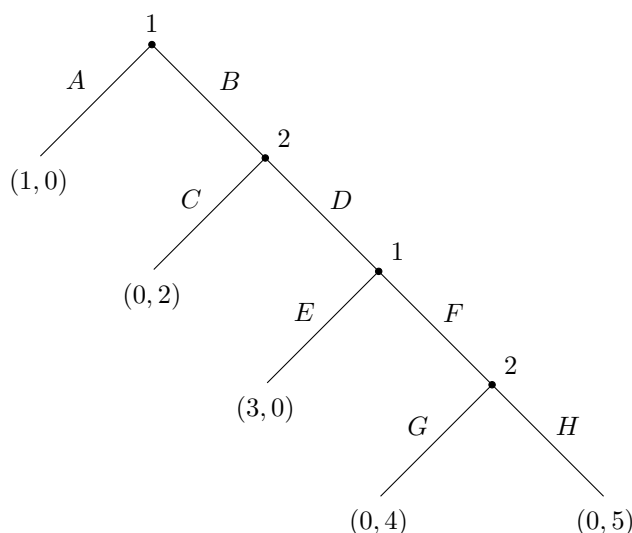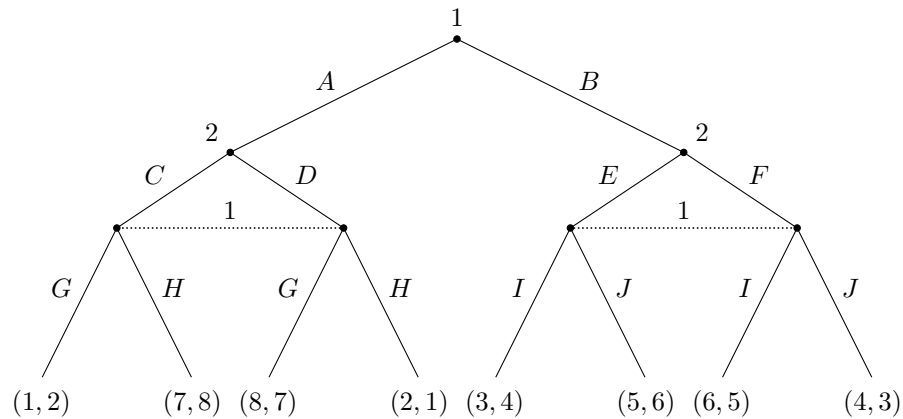
# Problem 2

# Problem 3

# Problem 4

Someone stole from a bloodthirsty crime boss. The boss is questioning one of his workers, seeking a confession. He says to the worker, "If you do not confess your crime, I will kill you." The worker agrees that the boss is going to kill him, but he notes that the boss' threat is not credible. Why is the worker correct? (Hint: What happens if the worker confesses?)

# Problem 5



2

## Problem 6

Consider a simplified version of the Centipedes game. There is a stack of N dollar bills. Player 1 can take $2 and end the game, or she can take one dollar and allow Player 2 to act. Then, if there are at least $2 left, Player 2 can either take $2 and end the game or take $1 and allow Player 1 to act, and so on. If there is only $1 left, the acting player takes the dollar.

(a) What is the SPINE for $N = 2$? $N = 3$?

(b) is the outcoe of the SPINE for $N = 10000000$

(c) A complete strategy is "always take $1 no matter what." What is the best response to that strategy, for some $N$?

(d) With words, while two chess grandmasters will always end up taking $2 immediately.