ECON 0200 - Problem Set 4

Due Tuesday, June 13

1. Consider the following two-person simultaneous-move game:
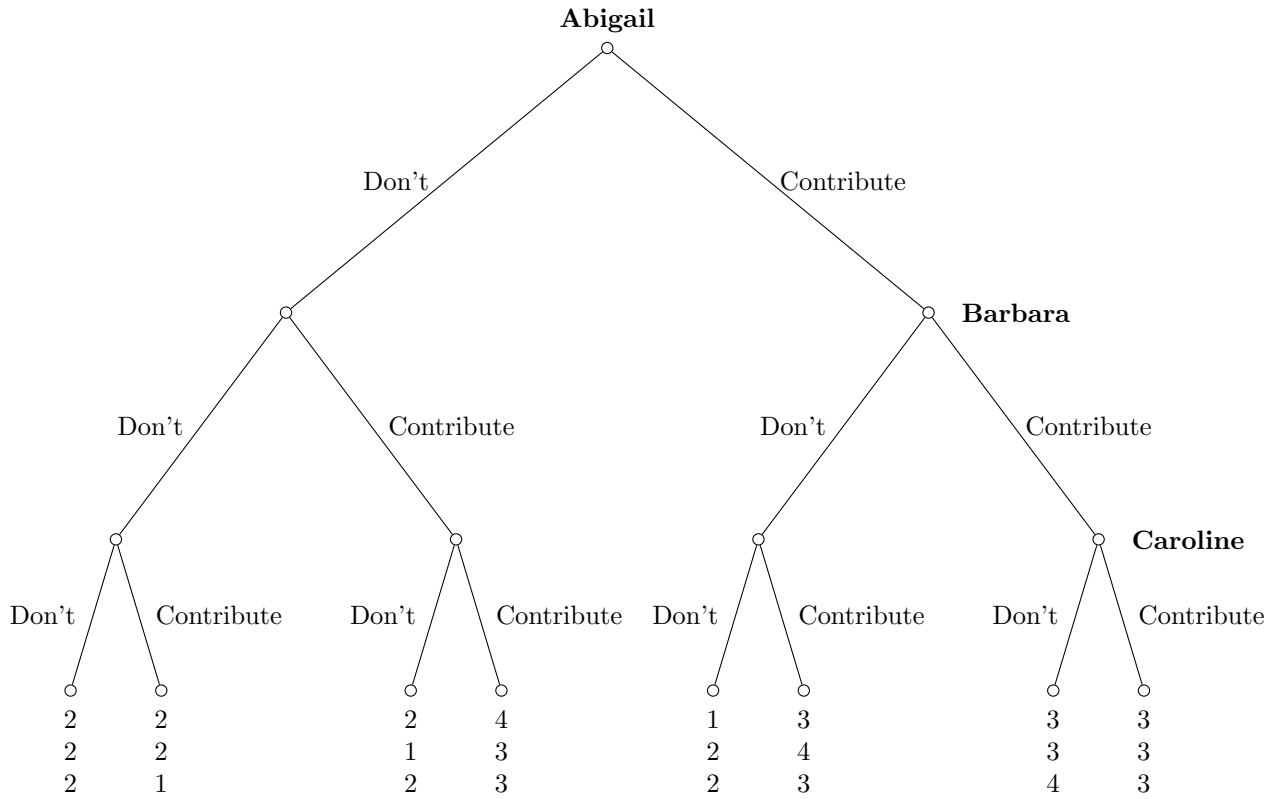
		Colin	
		Left	Right
Rowena	Up	2, 16	8, 6
	Down	4, 20	10, 30

   (a) Find the Nash equilibrium in mixed strategies for this game.

   (b) What are the players' expected payoffs in equilibrium?

   (c) Rowena and Colin jointly get the most money when Rowena plays Down. However, in equilibrium, she does not always play Down. Why not?

2. One day before an assignment due date, a professor receives an email from a student who claims to be stuck on one of the problems after working on it for some time. The professor would rather help the student if he has sincerely been working, but she would would rather not help if the student is just fishing for hints. The professor could pretend not to have read the email until later. Obviously, the student would rather receive help whether or not he has been working on the problem. But if help isn't coming, he would rather work than slack, since the assignment *is* due next day.
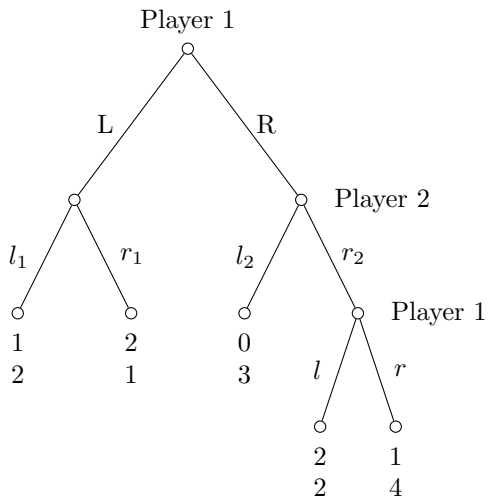
		Student	
		Work and ask for help	Slack and fish for hints
Professor	Help student	5, 5	−1, 6
	Ignore email	−2, 1	0, 0

   (a) What is the mixed-strategy Nash equilibrium of this game?

   (b) What is the expected payoff for each of the players in equilibrium?

3. Three players, Abigail, Barbara, and Caroline, all live on the same street. Each has been asked to contribute toward the creation of a flower garden where their small street intersect the main highway. The ultimate size and splendor of the garden depends on how many of them contribute. Furthermore, although each player is happy to have the garden - and happier as its size and splendor increase - each is reluctant to contribute because of the cost that she must incur to do so.

   Suppose that, if two or all three contribute, there will be sufficient resources to establish and maintain the garden. However, if one or none contribute, the garden is not set up. Finally, assume that the players move sequentially. Abigail has the first move, Barbara moves second, and Caroline moves last.

Abigail

Don't   Contribute

                                    Barbara

Don't   Contribute   Don't   Contribute

                                              Caroline

Don't Contribute Don't Contribute Don't Contribute Don't Contribute

 2   2   2   4   1   3   3   3
 2   2   1   3   2   4   3   3
 2   1   2   3   2   3   4   3

(a) Use backwards induction and find the SPNE for the game.

(b) Now consider a situation in which the three players decide simultaneously between *Contribute* and *Don't contribute*. Represent this situation in an extensive form game.

(c) Find all Nash equilibria for his new game.

4. Consider the following extensive form game:

Player 1

L   R

                        Player 2

l₁   r₁   l₂   r₂

                              Player 1

1   2   0   l   r
2   1   3

                           2   1
                           2   4

(a) Apply backwards induction and find all SPNE for this game.

(b) Write the game in strategic form and find all Nash equilibria in pure strategies.

5. Find all SPNE for the following extensive form game.

1

a_1 b_1

2   **2**

a_2 b_2 a_2 b_2 c_2

1   **1**   **1**   **1**

c_1 d_1 c_1 d_1 c_1 d_1 c_1 d_1 c_1 d_1

4   4   2   5   2   3   1   3   0   3
3   1   4   2   3   2   4   3   2   1