Name:

Problem 1

Find all the pure strategy Nash equilibria of this game.

	L	M	R
U	1, 1	2, 0	1, 3
S	5, 0	3, 2	0, 1
D	3, 0	4, 1	0, 0

Problem 2

Please illustrate a new game where one strategy for one of the players is strictly dominated by another strategy. Draw the normal form and indicate which strategy is strictly dominated by another strategy. (By "new," I mean a game that I did not use in class, on a homework, or elsewhere on this test, and which is not in your book.)

Problem 3

Please illustrate a new game where one strategy for one of the players is weakly dominated but *not strictly dominated* by another strategy . Draw the normal form and indicate which strategy is weakly dominated by another. (Same constraint on it being "new.")

Problem 3 continued on next page...

Problem 4

Find all (pure and mixed) Nash equilibria of this game:

	L	R
T	3, 4	1, 5
B	2, 6	4, 3

Problem 5

Use iterated elimination of strictly dominated strategies to find the unique Nash equilibrium of this game:

	L	M	R
T	2, 2	3, 1	2, 0
S	1, 4	0, 2	3, 3
B	1, 1	2, 3	1, 4

Problem 5 continued on next page...

Problem 6

Find all the pure strategy Nash equilibria of the following game:

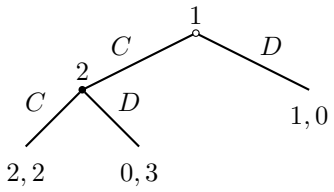
	L	M	R
T	2, 4	1, 3	3, 3
S	1, 3	3, 2	3, 5
B	1, 2	2, 4	3, 3

Problem 7

Use iterated elimination of weakly dominated strategies to find a unique solution to the game above. Write down the order of elimination of strategies that you used.

Problem 8

Here's an extensive form game:



What is the subgame perfect Nash equilibrium?

Problem 8 continued on next page...

Problem 9

Draw the normal form for the game pictured in the last problem. Circle all the pure strategy Nash equilibria (whether subgame perfect or not).

Problem 10

Consider the following game. There are two players, Shannon and Jake. Both want the parking space in front of their house, but Shannon gets there a split second earlier. She can first start to move toward the space. After observing her decision, Jake can decide if he wants to move toward the space. If they both move toward the space, they both get a payoff of -1 – they spend time arguing over who "deserves" the space. If only one of them moves toward the space the one who moves toward the space gets a payoff of 3 and the other one gets 1. If neither move toward the space they both get 2 (each person doesn't get the space, but they remain friends.)

Draw the extensive form of the game:

Problem 10 continued on next page...

Problem 11

Find the subgame perfect Nash equilibrium of the game you just drew.

Problem 12

Draw the normal form for the parking space game. Circle all the pure strategy Nash equilibria.

Problem 13

In your own words, briefly explain why it is weakly dominant in a sealed-bid, second price auction for each player to bid her value for the object.

Problem 14

In class I mentioned an auction called an "all-pay" auction. Like the other auctions, there is an object up for sale. Each person writes a bid down on a piece of paper and submits it to the auctioneer. The person who bid the highest gets the object (let's ignore ties for the moment). Unlike most auctions, *everyone* must pay their bid – both the losers and winners.

Suppose we have three bidders: Jake who values the object at \$15, Julie who values the object at \$20, and Carlos who values the object at \$10.

For each of the following say whether or not it is a Nash equilibrium of the game. If it is not a Nash equilibrium indicate what strategy would be a better response.

- Julie bids \$20, Jake bids \$15, Carlos bids \$10.

- Julie bids \$16, Jake bids \$0, Carlos bids \$0.

- Julie bids \$1, Jake bids \$0, Carlos bids \$0.

Extra Credit

Problem 15

What are all the pure and mixed strategy Nash equilibria for the extensive form game used in problem 8?

Problem 16

Consider the following extensive form game. There is a pile of 10 stones and two players. Player begins by removing one, two, or three stones. Player 2 then removes one, two, or three stones. This process continues until the last stone is removed. The player who removes the last stone loses and the other player wins.

What is the subgame perfect Nash equilibrium of this game?

Problem 17

What if we generalize the game from the last problem to an arbitrary number, N, of stones. What are the subgame perfect Nash equilibria for a game with N stones? (Note: it may depend on the value of N. If it does, give an answer for all possible values of N.)