Economics 500: Microeconomic Theory

State University of New York at Binghamton
Department of Economics
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Problem Set #13

1. In the following normal form game, what strategies survive iterated elimination of strictly dominated strategies.

	L	C	R
T	2,0	1,1	4,2
M	3,4	1,2	5,3
B	1,3	0,2	3,0

2. Players 1 and 2 are bargaining over how to split one dollar. Both players simultaneously name shares they would like to have, s_1 and s_2, where $0 \leq s_1$, and $s_2 \leq 1$. If $s_1 + s_2 \leq 1$, then the players receive the shares they named; if $s_1 + s_2 > 1$, then both players receive zero. Assuming that they can only bet in 25 cent increments, what are the dominated strategies? What are the pareto sub-optimal points? What are the pareto optimal points?

3. Consider the following lottery:

Probability	.5	.25	.25
Payoff	100	150	50

In a decision between 100 dollars and the lottery, what would the following types of agents choose: risk averse, risk neutral and risk loving?

4. Smith and Jones are playing a number-matching game. Each chooses either 1, 2, or 3. If the numbers match, Jones pays Smith \$3. If they differ, Smith pays Jones \$1.
   a. Describe the payoff matrix for this game and show that it does not possess a Nash Equilibrium.
   b. Show that with mixed strategies this game does have a Nash equilibrium if each player plays each number with probability 1/3. What is the value of this game?

5. Players A and B have found \$1 on the sidewalk and are arguing about how it should be split. A passerby suggests the following game: "Each of you state the number that you wish (s_1, s_2). If $s_1 + s_2 \leq 1$ you can keep the figure you name and I'll take the remainder. If $s_1 + s_2 > 1$, I'll keep the \$1. Is there a unique equilibrium in this game of continuous strategies?

6. Consider the following sealed-bid auction for a rare baseball card. Player A values the card being auction at \$600, player B values the card at \$500, and these valuations are known to each player who will submit a sealed bid for the card. Whoever bids the

most will win the card. If equal bids are submitted, the auctioneer will flip a coin to decide the winner. Each players must now decide how much to bid.

a. How would you categorize the strategies in this game? Do some strategies dominate others?
b. Does this game have a Nash equilibrium? Is it unique?
c. How would this game change if each player did not know the other's valuation for the card?

7. George is seen to place an even-money \$100,000 bet on the Kings to win the NBA Championship. If George has a logarithmic utility-of-wealth function ($u = \ln(w)$)and if his current wealth is \$1,000,000, what must he believe the minimum probability that the Kings win is?

8. Show that if an individual's utility-of-wealth function is convex (rather than the concave one we showed in class), he or she will prefer fair gambles to income certainty and may even be willing to accept somewhat unfair gambles. Do you believe this sort of risk-loving behavior is common? What factors might tend to limit its occurrence?

9. An individual purchases a dozen eggs and must take them home. Although making trips home is costless, there is a 50 percent chance that all of the eggs carried on any one trip will be broken during the trip. The individual considers two strategies:

   Strategy 1: Take all 12 eggs in one trip.

   Strategy 2: Take two trips with 6 in each trip.

   a. List the possible outcomes of each strategy and the probabilities of these outcomes. Show that on the average, 6 eggs will remain unbroken after the trip home under either strategy.
   b. Develop a graph to show the utility obtainable under each strategy. Which strategy will be preferable?
   c. Could utility be improved further by taking more than two trips? How would this possibility be affected if additional trips were costly?

10. Consider five individuals with the following utility functions:

    $u(w) = bw + cw^2$ ($b > 0$ and $c < 0$)

    $u(w) = w^4$

    $u(w) = w^{1/3}$

    $u(w) = a + bw$ ($b > 0$)

    $u(w) = a + \ln(w)$

    For each individual, check whether the individual is risk-neutral or risk-loving.