Final Exam: Economics 101 – June 12, 2002

READ THE INSTRUCTIONS: You have three hours. Do all 5 questions; each has equal weight. Please be sure to number each problem by number and part, especially if you choose to do them out of order. You will get credit *only if you provide a clear explanation of your answer and how you got it*. Write only in the blue book using pen; cross out any scratch work. Put the answers to questions 1,2 in the first bluebook; questions 3,4 in the second bluebook and question 5 in the third bluebook. Calculators are not allowed. Good luck.

1. Normal Form Games

In each of the following games

i) Find all of the pure strategy Nash equilibria.

ii) For games (a) and (b) only, determine whether or not there is a mixed strategy Nash equilibrium (in addition to the pure equilibria which are also considered mixed), and if so, what it is.

iii) Which of these equilibria are Pareto efficient?

iv) Do any of the pure strategy equilibria involve playing weakly or strictly dominated strategies?

v) Sketch the socially feasible set.

vi) Find a pure strategy that minimizes the payoff the other player can get (this is called the minmax payoff). Sketch the corresponding socially feasible individually rational set.

a)

	L	R
U	0,1	1,3
D	2,2	0,1

b)

	L	R
U	6,10	-10,14
D	10,-6	1,5

c)

	L	C	R
U	6,6	0,7	1,0
M	7,0	5,5	1,0
D	0,1	0,1	0,0

2. Repeated Games

	A	B
A	7,6	2,5
B	8,2	3,3

Suppose that this stage game is repeated between two infinitely lived players with discount factor equal to δ. Propose a strategy and a discount factor δ such that the Nash equilibrium outcome of the game is for both players to play AA. Are these strategies subgame perfect? What does the Folk Theorem tell us about this game?

3. Long Run versus Short Run

Maria must decide whether to bring her broken scooter to the dealer or to ScooterRepairsRus (SRU for short). If she brings it to the dealer it is costly to repair, but the scooter will work properly after the repair. This will give her a net utility of zero. On the other hand, if she brings the scooter to SRU, SRU may either fix the scooter cheap (worth a utility of 1), or rip her off (worth a utility of –1). SRU gets 0 if Maria brings the scooter to the dealer; 1 for fixing the scooter cheap and 7 for ripping her off.

a) Find the extensive and normal form of this game.

b) What pure strategy Nash equilibria are in the stage game; which are subgame perfect?

c)   What is the Stackelberg equilibrium of the stage game in which SRU moves first?

d) Suppose that this stage game is repeated: SRU is infinitely lived with discount factor equal to δ and there is a sequence of short-lived consumers (Maria and her friends). Propose a strategy and a discount factor δ such that in equilibrium players end up playing the Stackelberg equilibrium.

e) What difference would reputation make in the repeated case?

4. Decision Analysis

You are considering buying stock in BigAlbatross Corporation. There is a 60% chance the stock will go up and you will make a profit of $10K and a 40% chance the stock will go down and you will lose $10K. Or you can pay a stockbroker for an inside tip. If the stock is going up, there is an 80% chance the broker will be correct; and if it is going down a 90% chance he will be correct. What is the most you should pay the broker for his tip? [Hint/Note: You may not use a calculator. If you do the problem correctly, you should find conditional probabilities of the form $n/4$ and $m/13$. If you are in doubt, you do not have to simplify the results and may round off to find the optimal decision.]

5. Cournot with Uncertain Cost

Consider a Cournot Duopoly with demand $p = 17 - x$. There are two possible levels of marginal cost: low and equal to 1 or high and equal to 3. There is a 40% chance both firms are high cost, a 20% chance they are both low cost, a 20% chance firm 1 is high cost and firm 2 low cost, and a 20% chance firm 1 is low cost and firm 2 high cost. Assuming that each firm knows its own marginal cost and these probabilities, what are the equilibrium strategies of the two firms in the Bayesian Nash equilibrium of the Cournot Game? Please note that you must use conditional probabilities to correctly solve this problem. Compare industry output with the case in which both firms know their rivals (and their own) cost before they choose their level of output?