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Midterm Exam: Economics 101 – May 9, 2002

You have one hour and fifteen minutes. Do all 3 questions; each have equal weight. Use two bluebooks. Put the answers to questions 1 and 2 in one bluebook, and the answer to question 3 in the other. Good luck.

1. Short Answers

For each of the normal form games below, find all of the Nash equilibria. Which are Pareto Efficient?

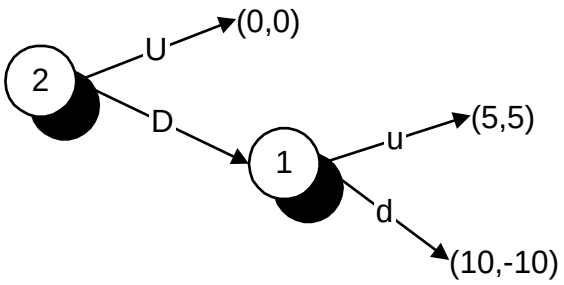
a)	L	R
U	10,10	14,0
D	0,14	12,12

b)

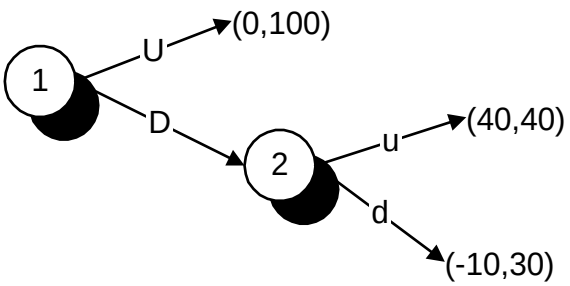
	L	R
U	4,0	5,2
D	6,1	4,0

For each of the extensive form games below, find the normal form and all Nash equilibria. Then find all of the subgame perfect equilibria. Which are Pareto Efficient?

c)



d)



2. Cournot with Imperfect Substitutes

Inverse demand for firm 1 is $p_1 = (17 - (x_1 + x_2))$, demand for firm 2 is $p_2 = (17 - (x_1 + x_2)) + b(17 - x_2)$. Here $b > 0$ is a parameter describing how much better good 2 is than good 1. Marginal cost is constant for both firms and equal to 1.

a) Find the profit for each firm as a function of the output of the two firms?

b) Find the Nash equilibrium levels of output for each firm.

c) What happens as the quality of good 2 improves (i.e. b gets larger)?

3. How to operate airport security?

Ms. A. Airline Passenger must decide whether put on her makeup. Later in the day, she must decide whether or not to put her nailclippers in her handbag. Ms. S. Screener at the airport must decide whether or not to search Ms. A. She observes whether Ms. A. is wearing makeup, but she only observes whether Ms. A is carrying nailclippers if she elects to search Ms. A. If Ms. A. is caught with the nailclippers, Ms. S. receives a nice promotion worth $1,000. If Ms. A. is searched without the nailclippers, Ms. S. is fired, and loses $4,000. If she elects not to search Ms. A. then Ms. S. gets nothing. Ms. A on the other hand, gets a utility of 10 if she puts on her makeup and brings her nailclippers, or if she leaves off the makeup and does not bring the nailclippers. She gets zero otherwise.

a) Find the extensive form of this game.

b) Find the *reduced* normal form of this game. Find all Nash equilibria of this game.

c) Which of the Nash equilibria are Pareto Efficient and which are not?

d) Apply the theory of iterated weak dominance to this game.