

University of British Columbia
Department of Economics

NAME:

Economics 221 (002 & 003)
Introduction to Strategic Thinking
Winter Session Term I, 2010

STUDENT NUMBER:

DISCUSSION GROUP / T.A.:

Midterm Examination

Time Allowed: 75 Minutes

Total Marks: 60

ANSWER ALL PARTS OF THE EXAMINATION.

PART A: *Answer all 4 questions. Each question is worth 5 marks.*

1. Find conditions on γ that make the following game solvable by iterated elimination of strictly dominated strategies. Find the equilibrium by iterative elimination of strictly dominated strategies.

		Player 2	
		x	y
Player 1	a	(9, 5)	(0, 0)
	b	(γ , 2)	(2, 3)
	c	(7, 3)	(3, 2)

2. What is a strategy for a firm in the Cournot model? Does a firm in the Cournot model have a strictly dominant strategy? Does a firm in the Cournot model have any strictly dominated strategies? You may use a figure to illustrate.

3. Suppose two firms in a Cournot duopoly have identical marginal costs. Starting at $q_1 = q^M$ and $q_2 = q^*$ where q^* is the competitive output level, use a figure that shows the Best response functions for both firms to demonstrate the stability of the Cournot equilibrium.

4. Explain the importance of the Common knowledge assumption for finding solutions to the following 3 types of games: (i) all players have strictly dominant strategies, (ii) a solution can be found by iterative elimination of strictly dominated strategies and (iii) coordination games such as:

			Player 2		
			L	R	
Player 1	U	(x, x)	$(0, 0)$		where $x > y > 0$
	D	$(0, 0)$	(y, y)		

PART B: Answer both questions. Each question is worth 20 marks.

1. Suppose that the interaction between a traveller driving across the border and a border guard can be modelled as a game with the usual assumptions of rationality and common knowledge. The traveller must choose whether to try to hide (H) a bottle of alcohol when crossing the border or leave it behind (L). The border guard must choose whether to search (S) the vehicle for any contraband or let the vehicle pass (P) through with no check. If a search is carried out and the traveller has alcohol, it will be found by the border guard. The game can be represented by the following matrix:

		Guard	
		S	P
Traveller	H	(0, 10)	(12, 2)
	L	(5, 4)	(4, 6)

- (a) Find a Nash equilibrium to the game. (6 marks)

(b) What is the probability that the Guard will choose to search and find nothing?
(4 marks)

(c) Suppose that there is a third player to this game. The Manager at the border crossing chooses which of two incentive systems (I_1 or I_2) will be put in place for the guards. If I_2 is chosen, the guard is very motivated to catch people smuggling and doesn't care about wait times at the border. Modifying the game to include the Supervisor we have: (traveller, guard, manager)

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Explain what it would mean for player G to have a strictly dominant strategy. Does any player in this game have a strictly dominant strategy? *(5 marks)*

(d) Find a Nash equilibrium to the game in (c). *(5 marks)*

2. Two firms compete in a Cournot duopoly market. The firms produce homogeneous goods and each firm has constant marginal costs. The marginal cost of firm 1 is $c_1 = \$80$. The marginal cost of firm 2 is $c_2 = \$80$. Market demand is $q = 8000 - 40p$.

(a) Find the best response function of firm 1. (*5 marks*)

(b) What is the monopoly output (when $c = \$80$)? (*3 marks*)

- (c) Find the Cournot-Nash equilibrium and determine the total output and price in the market. Show your equilibrium in a well-labelled diagram that shows the best response functions of each firm. Be sure to show the values of any intercepts or intersections. (7 marks)

- (d) Suppose that, recognizing that profits are maximized in a monopoly industry, both firms attempt to replicate this by agreeing to set the total output $q_1 + q_2$ equal to the monopoly level of output, with each firm producing $\frac{1}{2}q^M$. If firm 1 really thinks firm 2 will produce $q_2 = \frac{1}{2}q^M$, will firm 1 really want to stick to $q_1 = \frac{1}{2}q^M$? What output level should firm 1 set? What profits can firm 1 earn if firm 2 produces $q_2 = \frac{1}{2}q^M$? (5 marks)