University of British Columbia
Department of Economics

Economics 221 (004)
December 2012
M. Vaney

Final Examination

NAME

00

Part	*Points Available*	*Points Earned*
A.1	5	
A.2	5	
A.3	5	
A.4	5	
B.1	20	
B.2	20	
B.3	20	
Total	**80**	

Instructions

1. Check that your name and student number are on this cover page.
2. There are **16** pages to this exam (not including this cover page). Make sure you have all pages.
3. This exam is closed book and closed notes.
4. Answer *all* questions in part A. Answer *all* questions in part B.
5. You may use non-programmable, non-graphing calculators.
6. The exam has a total of 80 points. You have 150 minutes to complete this exam.
7. You may not leave the exam room during the last 10 minutes of the exam. Stay in your seat until the invigilator collects your exam and dismisses the class.
8. **DO NOT BEGIN THE EXAM UNTIL INSTRUCTED TO DO SO.**

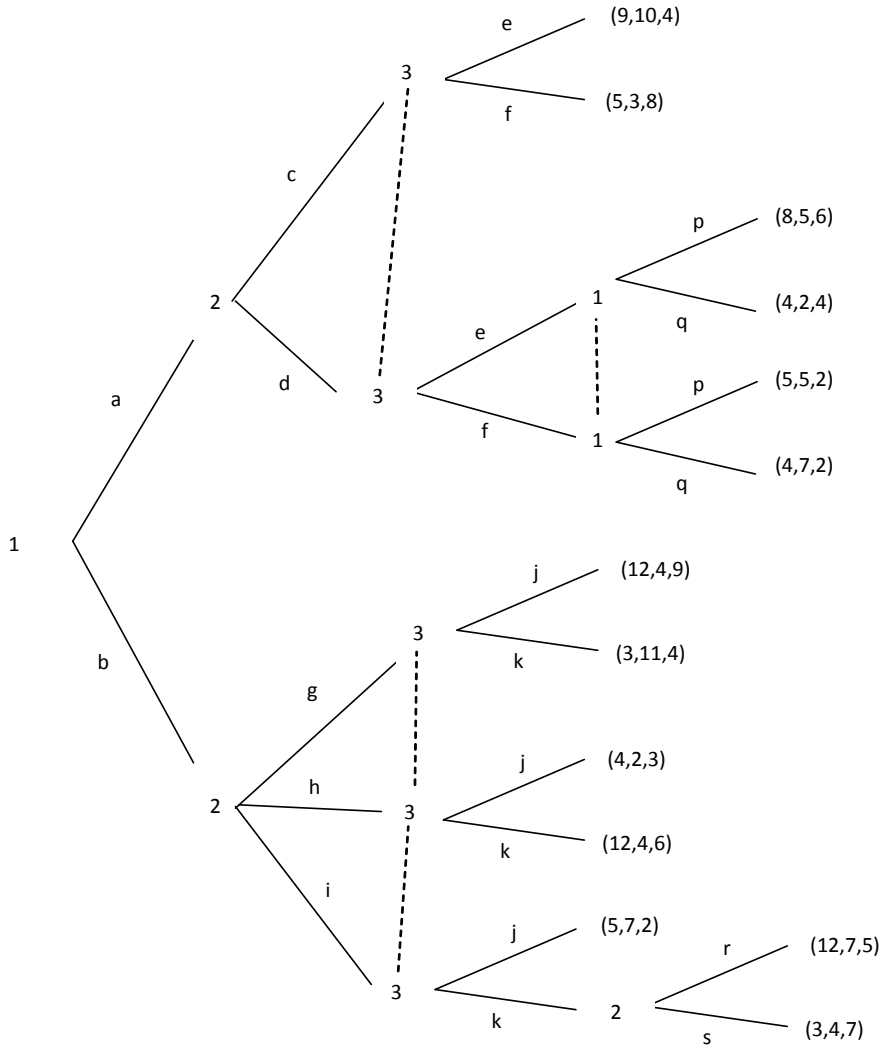
The University of British Columbia holds academic integrity as a core value of the institution. The penalties for cheating in an exam may include expulsion from the University and a notation of misconduct discipline on the student's transcript of academic record.

GOOD LUCK

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

1. In a Spence signalling model where high-ability workers can signal high ability at cost c^H but low-ability are unable to send the same signal, describe the conditions on c^H, w^H, w^L and θ^H where both a pooling and separating equilibrium are possible. A figure may help in your descriptions of the conditions but you should also provide some explanation of how it is possible that both types of equilibria could arise.

2. Consider the following game: payoffs are written as (payoff to player 1, payoff to player 2, payoff to player 3)



Identify all the subgames (circle above) and complete the following table:

Player	**# of actions in a strategy**	**# of strategies**
1		
2		
3		

3. What is the subgame perfect Nash equilibria to a sequential version of the Bertrand (price-setting) duopoly game when firms have constant and identical marginal costs?

4. State the difference between the following:

   (i) English-style and Dutch-style auctions

   (ii) First-price and Second-price auctions

   (iii) Winner-pay (highest bidder) and All-pay auctions.

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

1. Consider the following game between Player 1 and Player 2:

		Player 2	
		L	R
Player 1	U	$(12, x)$	$(6, y)$
	D	$(16, z)$	$(10, 7)$

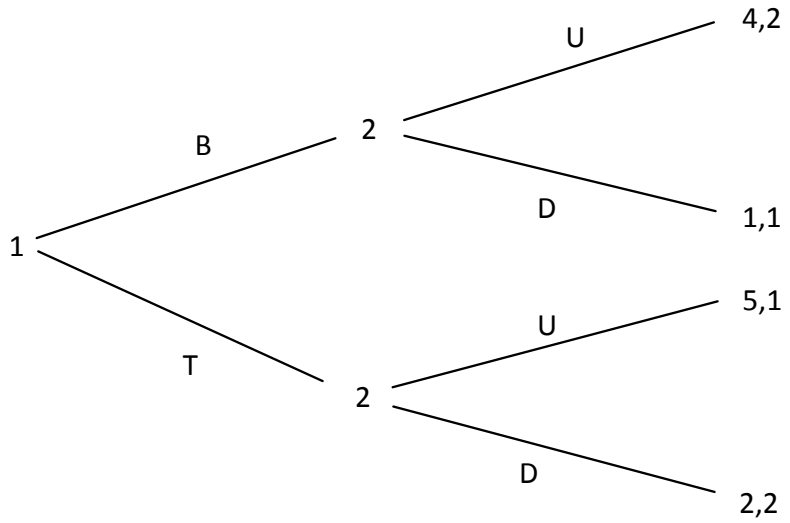
(a) What is the smallest (least restrictive) set of conditions on values of x, y and z such that $\{D, R\}$ will be a Nash equilibrium to the game? *(4 marks)*

(b) Let values x, y and z be such that $z < 7 < x < y$. If the game is repeated for an infinite number of periods and both players follow grim trigger strategies, what is the minimum discount factor for player 1 that will sustain a cooperative outcome as a subgame perfect Nash equilibrium. *(5 marks)*

(c) Let values x, y and z be such that $z < 6 < x = 10 < y < 14$ (the conditions in (b) still hold with the additional restrictions: $z < 6$, $x = 10$ and $y < 14$. In the infinite period game, with both players following grim trigger strategies, will the minimum discount factor for player 2 be larger or smaller than the minimum discount factor for player 1 that you found in part (b)? Explain how you arrive at your answer. *(5 marks)*

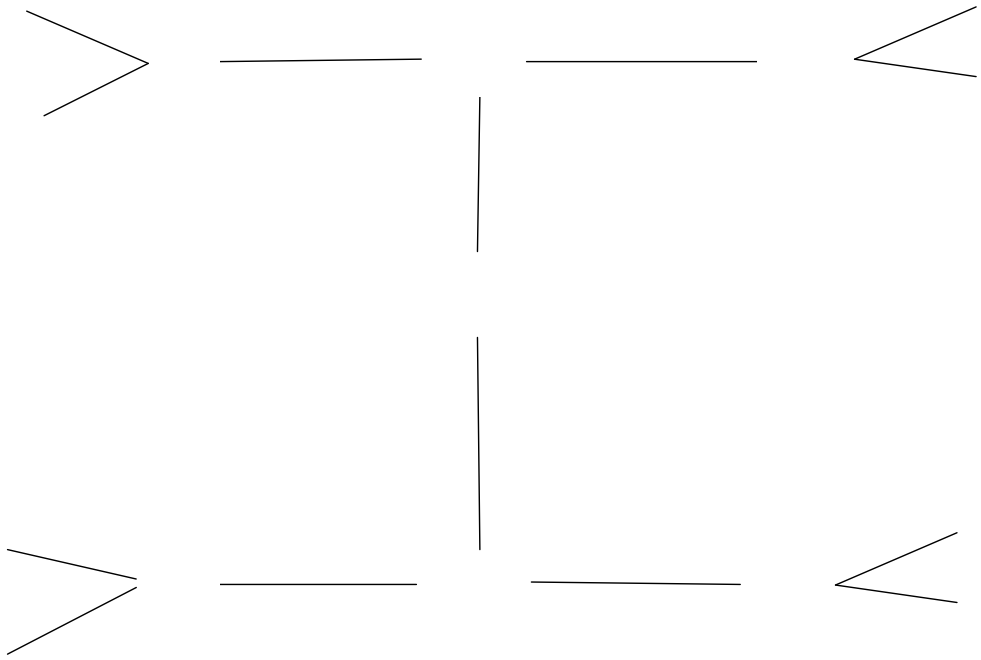
(d) Let values x, y and z be such that $z < 7 < x = 10 < y$. In the infinite period game, the largest present value of payoffs that player 1 can get in a subgame perfect Nash equilibrium to the game is $\frac{14}{1-\delta_1}$. Determine, if possible, the values of y and z. *(6 marks)*

2. Consider the following sequential game between player 1 and player 2. Payoffs are written as (payoff to player 1, payoff to player 2).



(a) Find a subgame perfect Nash equilibrium to this game. *(3 marks)*

(b) Suppose that player 2 does not always observe the move of player 1 correctly. With probability p $(0 < p < 1)$, player 2 correctly observes the move of player 1, so that player 1 playing B is observed as B and player 1 playing T is observed as T. With probability $1 - p$, player 2 makes an incorrect observation, observing B when in fact player 1 played T, and observing T when in fact player 1 played B. Complete the following game tree labelling the players, actions, information sets and payoffs. *(6 marks)*



(c) Find a pure strategy Bayesian Nash equilibrium to this game. Be sure to identify the strategy of each player and the beliefs of the uninformed player. *(6 marks)*

(d) Suppose that $p = \frac{2}{3}$. Consider a mixed strategy Bayesian Nash equilibrium where player 1 randomizes over B and T, playing B with probability α. Let A_i denote the actual choice of player 1 ($i = B$ or $i = T$) and let O_j denote the observed (by player 2) choice of player 1 ($j = B$ or $j = T$). Derive an expression for Player $2's$ belief that player 1 played T when 2 observes B, i.e. $\mathbb{P}(A_T|O_B)$. *(5 marks)*

3. Demand in a market is $Q = 1000 - P$. Two firms, firm I and firm E, compete in the market. The marginal costs of firm E are constant and equal to $c_E = 100$.

   (a) If the marginal costs of firm I are constant and equal to $c_I = 100$ (same as firm E), find the profits to both firms when firm I is a Stackelberg leader and firm E is a Stackelberg follower. *(6 marks)*

(b) What elements/characteristics make a move a "strategic move"? *(4 marks)*

(c) (Dixit model of entry deterrence) Suppose that firm I chooses a level of capacity, K_I. The marginal cost of each unit of output below capacity ($q_I < K_I$) is constant and equal to c_I^w, where $0 < c_I^w < c_I$ (reflecting only wage costs and no capital costs). The choice of capacity is made before firm E chooses whether to enter the market. Firm E faces a fixed cost of entry, $f = 30000$. If firm E enters the market, the two firms will compete as Cournot competitors. Explain whether this will be a case of Blockaded Monopoly. *(4 marks)*

(d) Is it possible to determine whether firm I will accommodate or deter entry by firm E? If so, explain what firm I will do. If not, explain why it is not possible to determine this. Is it possible to determine the equilibrium outcome in the model? If so, explain what capacity level firm I will set, whether firm E will enter, and the output of the firm(s) in equilibrium. If not, explain why it is not possible to determine this. *(6 marks)*