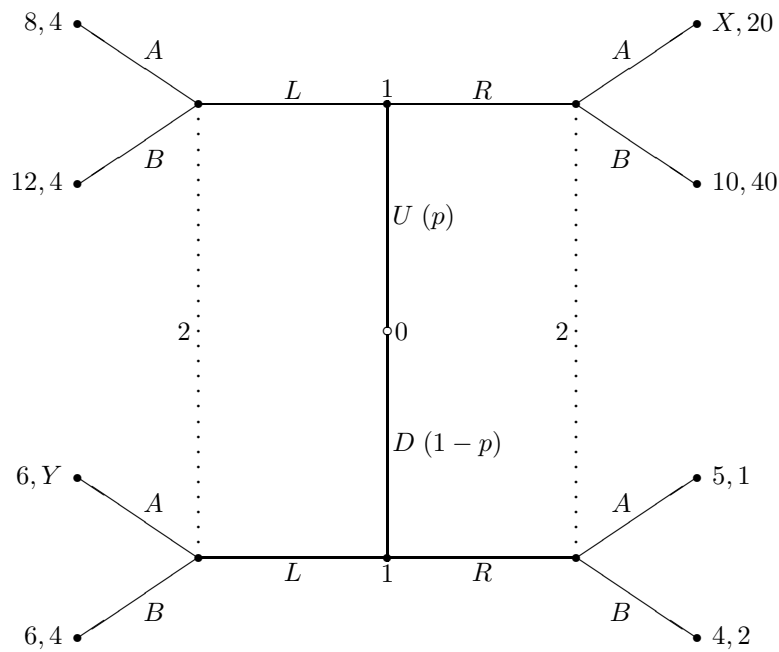


Microeconomic Theory II
Final Exam

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Carefully explain and support your answers.

Question 1. Consider the following game. First, nature (player 0) selects U with probability p , $0 < p < 1$, or D with probability $1 - p$. Next, player 1 selects L or R . Lastly, player 2 selects A or B . The game has three parameters: X , Y , and p .



- For what values of the parameters does the above game have a separating equilibrium? Explain.
- Do these separating equilibria satisfy the intuitive criterion? Explain.
- For what values of the parameters does the above game have a pooling equilibrium? Explain.
- Do these pooling equilibria satisfy the intuitive criterion? Explain.
- Explain why *neither* of the answers to (a) or (c) about pooling or separating equilibria depends on the value of p . Discuss if this is a general result of all signaling games or specific to this game.

Question 2. Consider a principal-agent model in which the agent has three levels of effort (low, medium, or high) and there are three possible outcomes (associated with profits for the principal of 20,000, 40,000, or 100,000). The principal is risk neutral with utility given by profits minus wages. The agent's utility function is given by $u(w, e) = \sqrt{w} - c(e)$, and the reservation utility is 0.

The following table provides the probability of each outcome given a level of effort and the agent's cost of effort.

By law, the agent's wage cannot be negative.

effort level	profit			c(e)
	20,000	40,000	100,000	
low	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	10
med	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	65
high	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	110

- (a) Assume that the principal can observe effort. What is the optimal contract? Show or explain.
- (b) Assume that the principal cannot observe effort (but can observe the outcome). What is the optimal contract? Carefully explain how you obtain your answer.

[Minor hints: *IF* you really feel the need to set up an optimization problem (i) at least one of the non-negative wage constraints will be binding and (ii) a derivative is not necessary.]

Question 3. Three widget manufacturers are planning to build factories in Storrs. Each firm ($i = 1, 2, 3$) must decide on the capacity (c_i) of its factory. These decisions are made in the following order:

1. First, firms 1 and 2 simultaneously select their capacity levels, c_1 and c_2 .
2. Second, firm 3 observes c_1 and c_2 and selects a capacity c_3 .

Once built, all firms operate at capacity. The industry price is given by:

$$p = 2 - \sum_{i=1}^3 c_i$$

Building capacity of c has a cost of c . Therefore, profits for firm i are given by:

$$pc_i - c_i$$

Determine the subgame perfect equilibrium.