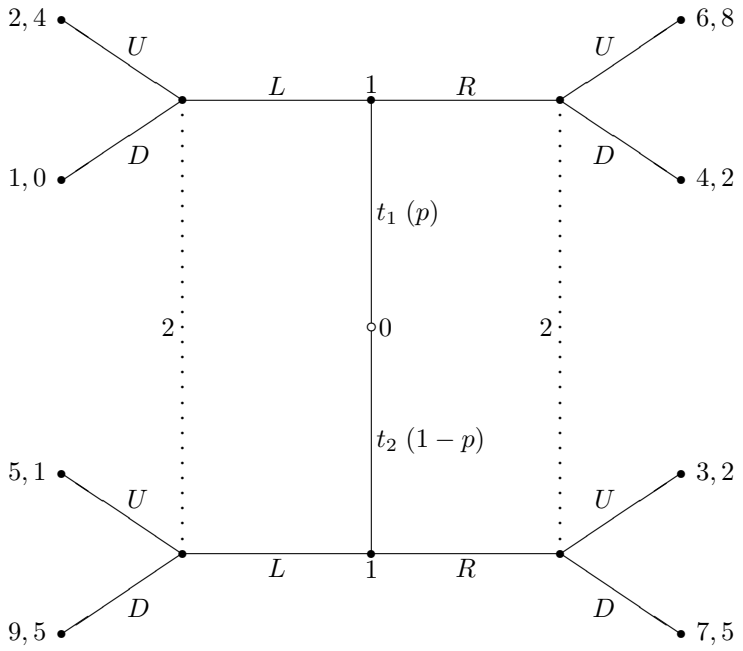
Microeconomic Theory II — Spring 2026

Final Exam — Mikhael Shor

Carefully explain and support your answers.

Question 1. Consider the following game. First, nature (player 0) selects t_1 with probability p, $0 < p < 1$, or t_2 with probability $1-p$. Next, player 1 selects L or R. Lastly, player 2 selects U or D. Player 1's payoffs are listed first.



(a) Find all values of p for which a pooling weak Perfect Bayesian equilibrium exists and show one such equilibrium.

(b) Find all values of p for which a separating weak Perfect Bayesian equilibrium exists and show one such equilibrium.

(c) Which equilibria survive the intuitive criterion? Carefully explain.

Question 2. Consider a principal-agent problem in which the agent chooses between two levels of effort, $e \in \{e_l, e_h\}$. The principal pays the agent a wage $w_s \geq 0$ in state s and realizes output of π_s. There are three states, with output levels $(\pi_1, \pi_2, \pi_3) = (1, 10, 49)$. The probability of a state s (or output π_s) conditional on the agent's effort is given by:

	π_1	π_2	π_3
	1	10	49
e_l	$\frac{2}{9}$	$\frac{4}{9}$	$\frac{3}{9}$
e_h	$\frac{1}{9}$	$\frac{2}{9}$	$\frac{6}{9}$

The agent's utility is $u(w, e) = \ln w - c(e)$, where $c(e_h) = \ln 4, c(e_l) = \ln 2$, and the agent's reservation utility is $\underline{u} = 0$. The principal is risk neutral with utility in state s given by $\pi_s - w_s$.

The agent's effort is unobservable.
The state is observable by both the agent and the principal.

(a) Determine the wage schedule that optimally implements e_l.

(b) Determine the wage schedule that optimally implements e_h.

(c) Imagine that the government institutes a minimum wage, $\hat{w} \geq 1$, requiring that $w_s \geq \hat{w} \ \ \forall s$. Find the range of $\hat{w}$ for which the principal:

   i. implements high effort,

   ii. implements low effort, and

   iii. does not contract with the agent.

Question 3. Two identical firms (1 and 2) each currently earn steady profits from existing products. Each is considering whether to develop a next-generation product.

Stage 1. Each firm simultaneously decides whether to Innovate (I) or Not Innovate (N). Innovation requires an upfront R&D cost of 2.

Stage 2. Payoffs depend on the Stage 1 decisions:

- If **both firms innovate**, each must choose a technology platform from $\{A, B, C, D\}$ for its new product. These choices are made simultaneously, with payoffs given by:

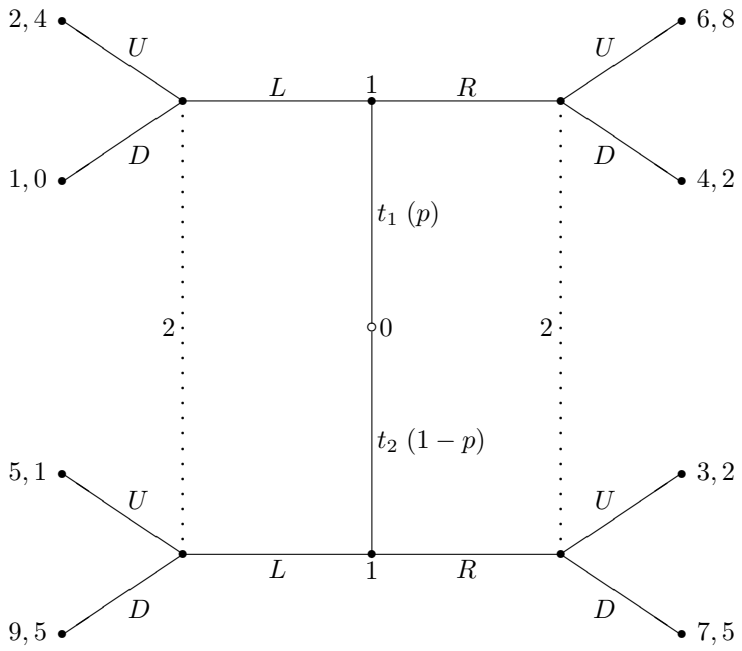
		Firm 2			
		A	B	C	D
Firm 1	A	$6,6$	$4,5$	$5,3$	$1,4$
	B	$5,4$	$3,3$	$7,1$	$0,2$
	C	$3,5$	$1,7$	$2,2$	$7,3$
	D	$4,1$	$2,0$	$3,7$	$3,3$

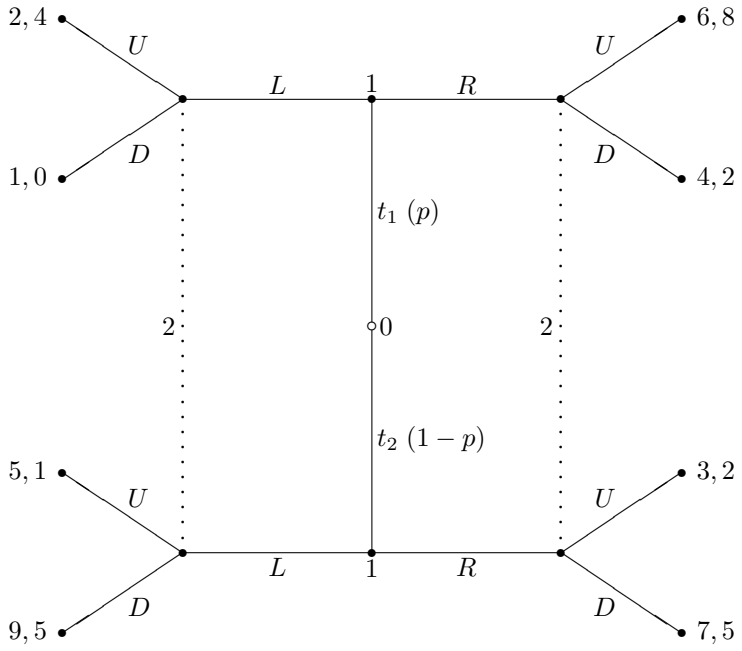
- If **exactly one firm innovates**, the innovating firm earns 14 and the other firm earns 0.
- If **neither firm innovates**, both earn 8 from their existing products.

Each firm's total payoff equals its Stage 2 payoff minus any R&D cost.

(a) Find all subgame-perfect Nash equilibria of this two-stage game. Show each step and argue or demonstrate that no other equilibria exist.

(b) What is each firm's equilibrium payoff?


2, 4
U
6, 8
U
L
1
R
D
D
1, 0
4, 2
t_1 (p)
2
0
2
t_2 $(1-p)$
5, 1
U
3, 2
U
L
1
R
D
D
9, 5
7, 5


2, 4
U
6, 8
U
L
1
R
D
D
1, 0
4, 2
t_1 (p)
2
0
2
t_2 $(1-p)$
5, 1
U
3, 2
U
L
1
R
D
D
9, 5
7, 5