Микроэкономика 2 — МИЭФ, 2025 demo midterm

МИЭФ · Микроэкономика 2 · 2025 · demo midterm

Рисунки пока рендерятся в тестовом режиме и могут отличаться от исходных материалов.

PROBLEM 1

Commodity taxation — 30 points

John consumes two goods, X and Y. His preferences are represented by

$$U(X,Y) = 2\sqrt{X} + Y.$$

Initially,

$$p_X = 1, \qquad p_Y = 2, \qquad m = 6.$$

The government introduces a per-unit tax t on good X.

(a) Compute the tax rate t^* that maximizes the government's tax revenue.

(b) Would the answer to part (a) change if John's income were

$$\widetilde{m} = 1?$$

(c) Continue to assume

$$(p_X, p_Y, m) = (1, 2, 6)$$

and suppose the per-unit tax is

$$t = \frac{1}{4}.$$

The government replaces the per-unit tax by a lump-sum tax T equal to the change in consumer surplus associated with t.

By how much does this replacement increase or decrease government revenue?

(d) Would the government obtain more or less revenue if it instead set the lump-sum tax T equal to the equivalent variation associated with t?

Would this option be more preferable for the consumer?

PROBLEM 2

Saving and insurance under uncertainty — 30 points

Judith lives for two periods, $t = 0, 1$. Her utility function is

$$U(c_0, c_1) = -\frac{100}{c_0} + \sqrt{c_1},$$

where c_t is consumption in period t.

Her current-period income is

$$m_0 = \$100.$$

Her future-period income is random:

$$m_1 = \begin{cases} 16, & \text{if there is a crisis,} \\ 49, & \text{if there is no crisis.} \end{cases}$$

The probability of a crisis is

$$\frac{1}{3}.$$

Financial markets are absent: Judith can neither borrow nor lend.

(a) The government offers Judith a savings program. She must invest exactly one half of her current income m_0 in an asset whose net return is

$$r = \begin{cases} -0.04, & \text{if there is a crisis,} \\ 0.02, & \text{if there is no crisis.} \end{cases}$$

Will Judith agree to participate in the program?

(b) The government offers Judith an insurance contract. In period $t = 1$:

- she receives an additional $20 if there is a crisis;
- she pays $x if there is no crisis.

What is the maximum amount x that Judith is willing to pay?

By how much does her expected future consumption decrease if she buys this insurance?

Illustrate the answer in a contingent-commodities diagram.

(c) The government offers to pay Judith $y in the current period, while promising to increase her future income by $33 if a crisis occurs.

What is the maximum amount y that Judith is willing to pay?

Illustrate the answer in a wealth-utility diagram.

PROBLEM 3

Game theory — 40 points

(a) (10 points) Mixed-strategy equilibrium

Consider the following normal-form game:

Player 1 \ Player 2	A_2	B_2
A_1	$(?, ?)$	$(?, ?)$
B_1	$(7, 1)$	$(2, 4)$

The players use a mixed-strategy Nash equilibrium:

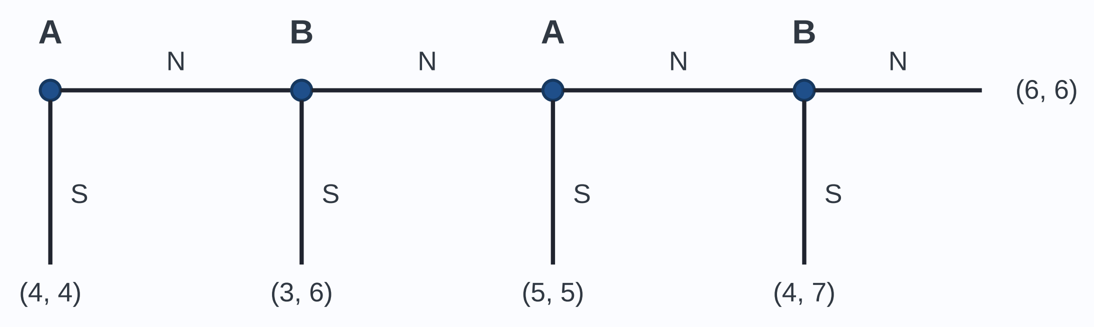
$$\{pA_1 + (1-p)B_1;\ qA_2 + (1-q)B_2\}, \qquad 0 < p < 1, \quad 0 < q < 1.$$

It is known that the equilibrium expected payoff of player 1 is 3.

What information about q, p, or both can be inferred from this fact?

(b) (12 points) Sequential game

Consider the following sequential game with players A and B:



Alternating stop-or-continue game

(i) Identify all subgames and find all pure- and mixed-strategy subgame-perfect Nash equilibria. Begin from the definition of SPNE.

(ii) Suppose player A chooses S at both of her decision nodes. Player B chooses S at his first decision node and N at his last decision node.

- Is this strategy profile a Nash equilibrium? If yes, prove it. If no, explain what is wrong with it.
- Does the strategy profile contain a non-credible threat? Begin with a definition and explain carefully.

(c) (8 points) Infinitely repeated game

Suppose the following game is repeated infinitely, and both players have a common discount factor

$$\delta \in (0,1).$$

Player 1 \ Player 2	A_2	B_2
A_1	$(3,5)$	$(1,6)$
B_1	$(7,1)$	$(2,4)$

Consider the statement:

For sufficiently high values of δ, there is an SPNE in which (A_1, A_2) is played in the first two periods and (B_1, B_2) is played in every subsequent period.

Is the statement true or false? Explain carefully.