

Advanced Microeconomics
Exam Winter 2009/2010

You have to accomplish this test within **120 minutes**.

PRÜFUNGS-NR.:

STUDIENGANG:

NAME, VORNAME:

UNTERSCHRIFT DES STUDENTEN:

ANFORDERUNGEN/REQUIREMENTS:

Lösen Sie die folgenden Aufgaben!/Solve all the exercises!

Schreiben Sie, bitte, leserlich!/Write legibly, please!

Sie können auf Deutsch schreiben!/You can write in English!

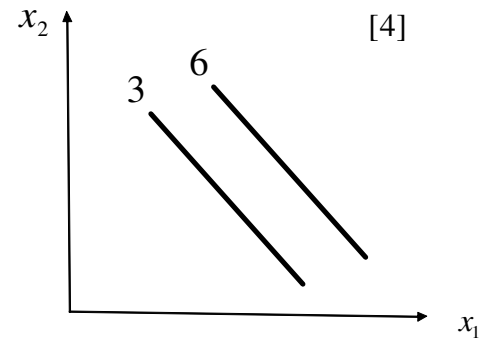
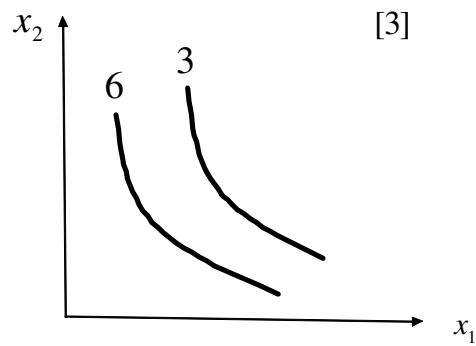
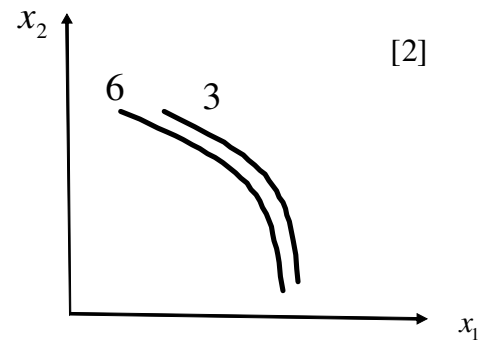
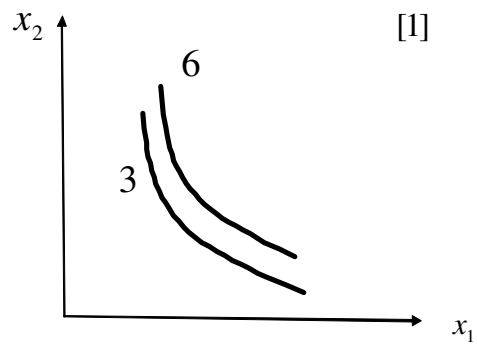
Begründen Sie Ihre Antworten!/Give reasons for your answers!

Problem 1 (10 points)

Which of the properties

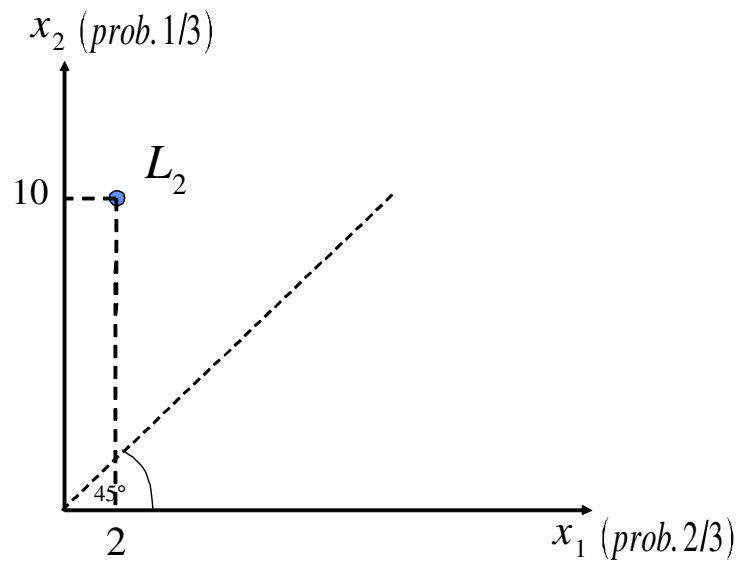
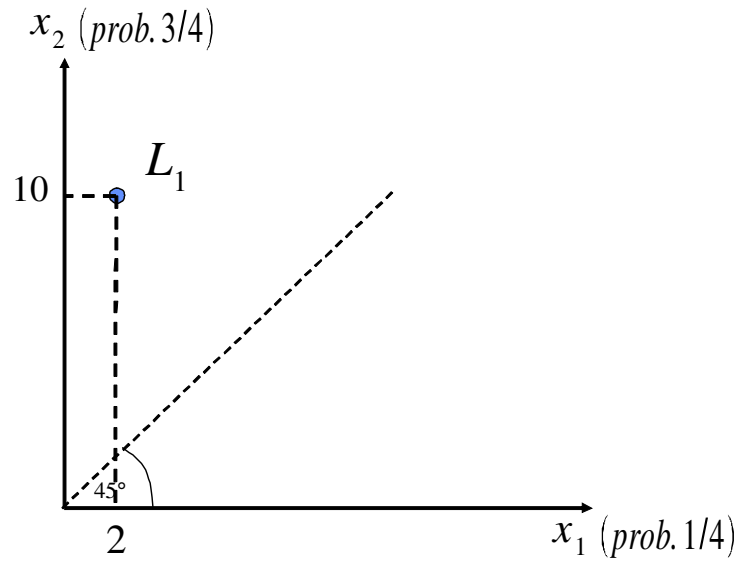
- (strict) monotonicity and/or
- (strict) convexity

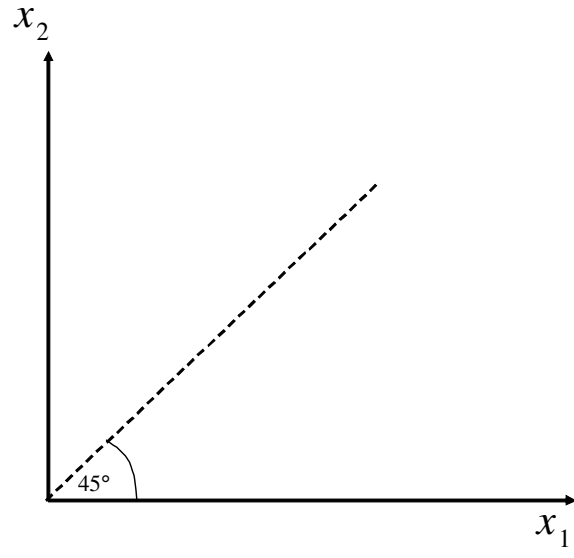
do the preferences depicted by the indifference curves in the graphs below satisfy? Define strict convexity and show graphically how this definition applies to one of the subgraphs chosen by you.



Problem 2 (10 points)

Draw the compound lottery $L := [L_1, L_2; \frac{1}{2}, \frac{1}{2}]$ in the third diagramm.





Problem 3 (10 points)

Prove Walras' law: Given local nonsatiation, we have $p \cdot x^* = m$ for all $x^* \in x^R(B(p, m), \succeq)$.

Problem 4 (5 points)

Two goods g and k belong to the same market if their cross elasticity of demand ... Complete the sentence and explain.

Problem 5 (15 points)

Consider the following Copenhagen n -country game in strategic form with $n \geq 20$. Each country i has to decide if it wants to contribute to the reduction of greenhouse gas emissions. Contributing costs 4 and the benefits depend on whether at least 10 countries join the effort. Consider some country i and let $m \in \{0, \dots, n-1\}$ denote the number of *other* countries that reduce their emissions. Then country i 's payoff if it reduces emissions is given by

$$x_i(m) = \begin{cases} 2(m+1) - 4, & m < 9, \\ 5(m+1) - 4, & m \geq 9, \end{cases}$$

and if it does not reduce emissions it is given by

$$x_i(m) = \begin{cases} 2m, & m < 10, \\ 5m, & m \geq 10. \end{cases}$$

You might find the following payoff table helpful:

$m =$	0	1	2	...	9	10	...	19
reduce	-2	0	2	...	$5 \cdot 10 - 4$	$5 \cdot 11 - 4$...	$5 \cdot 20 - 4$
not reduce	0	2	4	...	$2 \cdot 9$	$5 \cdot 10$...	$5 \cdot 19$

- (a) What is the best response of a country if less than 9 other countries reduce emissions?
- (b) What is the best response of a country if at least 9 other countries reduce emissions?
- (c) Determine all pure Nash equilibria in this game!

Problem 6 (15 points)

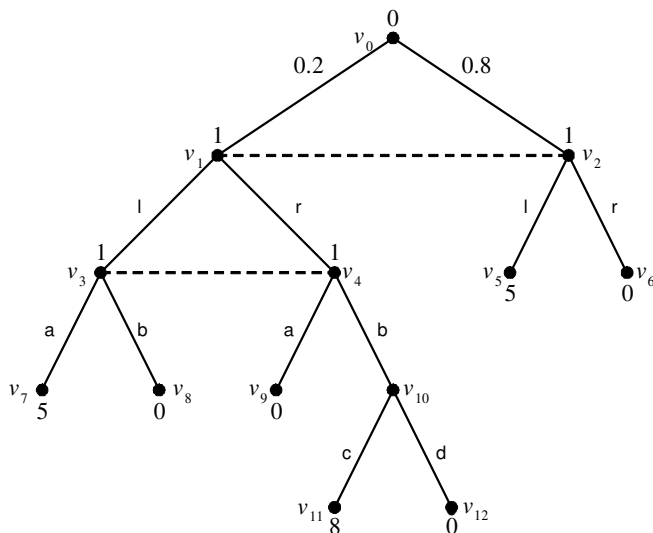
Consider the following utility function $U(x_1, x_2) = \sqrt{x_1} + \sqrt{x_2}$. Determine the Marshallian and Hicksian demand functions, the expenditure function, and the indirect utility function!

Problem 7 (10 points)

State the revelation principle and explain its connection with the Clarke-Groves mechanism!

Problem 8 (20 points)

Consider the following decision situation:



- (a) Provide a list of all pure strategies the decision maker has!
- (b) Determine the information partition of the decision maker! *Hint: An information partition I is a partition of the decider maker's set of decision nodes D .*
- (c) What is the experience of the decision maker at the decision nodes v_3 and v_4 , respectively? Is this a decision situation with perfect recall?
- (d) How many proper subtrees can you identify?
- (e) Determine all optimal strategies!

Problem 9 (15 points)

Consider a Bertrand duopoly: Two firms 1 and 2 operate on a market characterized by the demand function $D(p) = a - b \cdot p$ where $a, b > 0$ hold. The two firms have identical constant marginal and average costs c obeying $\frac{a}{b} > c > 0$. The firms choose their prices $p_1, p_2 \in [0, \frac{a}{b}]$, respectively. Consumers buy at the cheapest price. If $p_1 = p_2$ holds, demand is split evenly among the firms. Strangely enough, firm 1 has a philanthropic CEO who maximizes the sum of profits of both firms instead of the profit of firm 1. Firm 2 is more professional and tries to maximize its own profit.

- (a) Suppose that both firms act simultaneously. Determine the set of Nash equilibria!
- (b) Now suppose that the firms act sequentially. i.e., first firm 1 chooses its price, firm 2 observes p_1 and then chooses its own price p_2 . Determine the subgame perfect equilibria in this game!

Problem 10 (10 points)

Find all the equilibria in pure and properly mixed strategies:

		player 2	
		s_2^1	s_2^2
player 1	s_1^1	5, 5	0, 4
	s_1^2	4, 0	4, 4

Draw the best responses!