i Information

ECON3200/4200 - Microeconomics and Game Theory

This is some important information about the written exam in ECON3200/4200. Please read this carefully before you start answering the exam.

Date of exam: Monday, November 19, 2018

Time for exam: 09.00 a.m. – 12.00 noon

The problem set: The problem set consists of 12 problems. Some of them are multiple choice, and some are essays. They count as indicated.

Sketches: You may use sketches on question 2 and 3. You are to use the sketching sheets handed to you. You can use more than one sketching sheet per question. See instructions for filling out sketching sheets on your desk. You will NOT be given extra time to fill out the "general information" on the sketching sheets (task codes, candidate number etc.) Do NOT hand in sketches on other questions than question 2 and 3.

Access: You will not have access to your exam right after submission. The reason is that the sketches with equations and graphs must be scanned in to your exam. You will get access to your exam within 2-3 days.

Resources allowed: No written or printed resources - or calculator - is allowed (except if you have been granted use of a dictionary from the Faculty of Social Sciences).

Grading: The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

Grades are given: Monday 10 December 2018, at 4 p.m.

1 Question 1: 5 points

Question 1: 5 points

Among the following properties, select all those that cost functions (of a profit-maximizing firm operating in a competitive market) need to satisfy.

Select one or more alternatives:

- ☐ The derivative of the cost function with respect to input price gives the compensated demand of that input
- ☐ Non decreasing in output quantity
- ☐ If technology is monotonic and continuous, strictly decreasing in output quantity
- ☐ Strictly increasing in at least one input price
- ☐ Concave with respect to output quantity
- ☐ Homogeneous of degree 0 in prices
- ☐ Strictly increasing in input prices
- ☐ Non decreasing in input prices

Maximum marks: 5

2 Question 2: 20 points

Question 2: 20 points

In this question you can hand in sketches. Use the sketching paper handed to you in the examination venue. See instructions on your desk.

A firm has a production function $f(x_1, x_2, x_3) = \min\{x_1, x_2 + x_3\}$. For this firm:

a) determine the cost function;

b) establish the vector of the conditional factor demands, when prices of inputs are $\boldsymbol{w} = (1, 2, 3)$;

c) briefly discuss the complementarity/substitutability between inputs and how this is reflected in the conditional factor demands.

Fill in your answer here or on sketching paper

Maximum marks: 20

3

Question 3: 15 points

Question 3: 15 points

In this question you can hand in sketches. Use the sketching paper handed to you in the examination venue. See instructions on your desk.

Matt has the following utility function $u(x_1, x_2) = x_1^{1/3} x_2^{2/3}$. To help Matt choose what is best for him:

a) determine his Walrasian demand function and show that it is optimal for him to spend a fix proportion of his money on each good, independently of the level of prices;

b) compute the indirect utility function and verify Roy's identity for good 1.

Fill in your answer here or on sketching paper

Maximum marks: 15

4

Question 4: 10 points

Question 4: 10 points

More specifically, assume now that Matt's preferences u of the previous question are defined over monetary outcomes in 2 different states of nature: x_1 is the monetary outcome at state 1 and x_2 at state 2. Among the following statements, select those that are correct:

Select one or more alternatives:

- [ ] The risk premium of the lottery (8,64) is 2
- [ ] The index of absolute risk aversion is constant and equal to 1
- [ ] Matt's preferences are convex
- [ ] Matt is risk neutral
- [ ] Matt's preferences satisfy the independence axiom
- [ ] The risk premium of the lottery (8,64) is 4
- [ ] The index of relative risk aversion is constant and equal to 1

Maximum marks: 10

5

Question 5: 6 points

Question 5: 6 points

Consider the stag hunt game where two players go on a hunt. Simultaneously and independently, they each decides whether to hunt stag or hare. If a player hunts for hare, he will definitely catch one (worth 4 units of utility), regardless of whether the other player joins him for the hunt for this kind of animal. On the other hand, two players are required to catch a stag (which yields 5 to both players). Hence, the game has the following normal form.

	Stag	Hare
Stag	5, 5	0, 4
Hare	4, 0	4, 4

Find the pure strategy Nash equilibria.

Select one or more alternatives:

- ☐ (Stag, Stag)
- ☐ (Hare, Hare)
- ☐ (Stag, Hare)
- ☐ (Hare, Stag)

Maximum marks: 6

6 # Question 6: 4 points

Question 6: 4 points

Consider again the Stag Hunt game of the previous question. Discuss what will happen in this strategic situation.

Fill in your answer here

Maximum marks: 4

7 # Question 7: 4 points

Question 7: 4 points

Consider a variant of the Stag Hunt game where a is subtracted from the utility of player 1 if player 2 chooses Stag and where b is subtracted from the utility of player 2 if player 1 chooses Stag. Hence, the new normal form is:

	Stag	Hare
Stag	5 - a, 5 - b	0, 4 - b
Hare	4 - a, 0	4, 4

Discuss whether this is the same or a different strategic situation. In particular, does the set of Nash equilibria change?

Fill in your answer here

Maximum marks: 4

8 # Question 8: 2 points

Question 8: 2 points

Consider the following normal form game

	Stag	Hare
Stag	1, 1	0, 0
Hare	0, 0	4, 4

This game is the variant of the Stag Hunt game considered in the previous problem when a equals (3, 1, 2, 5, 6, 4). and b equals (1, 2, 3, 4, 5, 6)

Maximum marks: 2

9 # Question 9: 4 points

Question 9: 4 points

Consider the normal form game of the previous question. Discuss what will happen in this strategic situation. Compare with your answer to the same question in the case of the original Stag Hunt game.

Fill in your answer here

Maximum marks: 4

10 # Question 10: 10 points

Question 10: 10 points

Consider the penalty kick in soccer. There are two players, the goalie and the striker. The striker has two strategies: kick to the goalie's left (L) or to the goalie's right (R). The goalie has two strategies: move left (L) or move right (R). Let a be the probability that the kick is stopped when both choose L and let b be the probability that the kick is stopped when both choose R. Assume that $0 < a < b < 1$. Consequently, the striker is more sklled at kicking to goalie's left. The normal form of this game is as follows, where the goalie chooses a row (is player 1) and the striker chooses a column (is player 2).

Goalie \ Striker	L	R
L	a, 1 - a	0, 1
R	0, 1	b, 1 - b

This game has a unique Nash equilibrium in mixed strategies where the goalie moves to the left with probability (a/(a+b), b/(a+b), 1, 0, 1/2) and where the kicker kicks to the goalie's left with probability (0, a/(a+b), 1/2, b/(a+b), 1).

Maximum marks: 10

11 # Question 11: 10 points

Question 11: 10 points

Consider the penalty kick game of the previous question.

(a) Would you expect a striker who is more skilled at kicking to the goalie's left than to his right, to score more often when he kicks to the goalie's left? Would it be wise to judge a striker's relative scoring ability in kicking left versus right by comparing the fraction of times he scores when he kicks right versus the fraction of times he scores when he kicks left? (Weight: 5/10)

Fill in your answer here

(b) Explain why knowing the fraction of times a goal was scored when both players choose L and the fraction of times a goal was scored when both players choose R would permit you to correctly deduce the player's scoring ability then kicking left and right. (Weight: 5/10)

Fill in your answer here

Maximum marks: 10

12

Question 12: 10 points

Question 12: 10 points

Consider the 'take-it-or-leave-it' game that we played in class. A referee has N times 10 kroner. He places 10 kroner on the table. Player 1 can either take the 10 kroner coin or leave it. If she takes them, the game ends. If she leaves it, the referee places a second 10 kroner coin on the table. Player 2 is now given the option of taking the 20 kroner or leaving them. If he takes them, the game ends. Otherwise the refere places a third 10 kroner coin on the table and it is again player 1's turn to take or leave the 30 kroner. The game continues in this manner with the players alternately being given the choice to take all the money the referee has so far placed on the table and where the referee adds 10 kroner to the total whenever a player leaves the money. If the last player to move chooses to leave the N times 10 kroner the game ends with the money going to the other player. Assume that N is public information.

(a) If two of your co-students would be asked to play this game, what would you think would happen? Would it make a difference if N were very large (like one thousand) or quite small (like 5)? (Weight: 2/10)

Fill in your answer here

(b) What are the backward induction strategies for the two players? (Weight: 6/10)

Fill in your answer here

(c) What does your answers under (a) and (b) mean for the ability of backward induction to predict actual behavior? (Weight: 2/10)

Fill in your answer here

Maximum marks: 10