



Course name: Economic Strategic Thinking
Course code: EC2109
Type of exam: Main
Examiner: Adam Jacobsson
Number of credits: 7.5 ECTS
Date of exam: March 18, 2020
Examination time: 9:00-12:00
Aids: You may use your book, notes, calculator.

Write your personal identity number on each answer sheet.

Explain notions/concepts and symbols. If you think that a question is vaguely formulated, specify the conditions used for solving it. Only legible exams will be marked.

The exam consists of 6 questions. Each question is worth 10 to 32 points, 100 points in total. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.

Your results will be made available on your Ladok account (www.student.ladok.se) within 15 working days from the date of the examination.

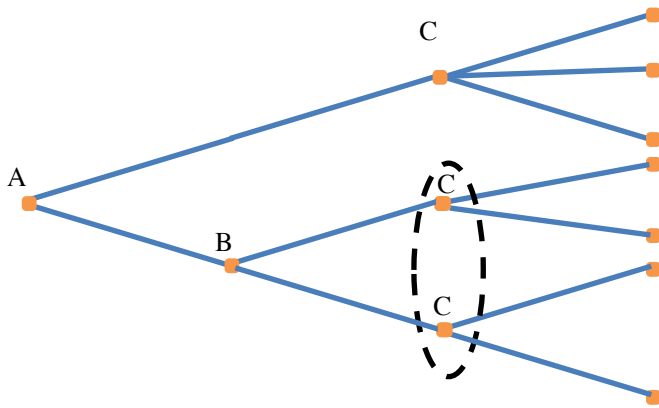
Good luck and

Keep calm and carry on!

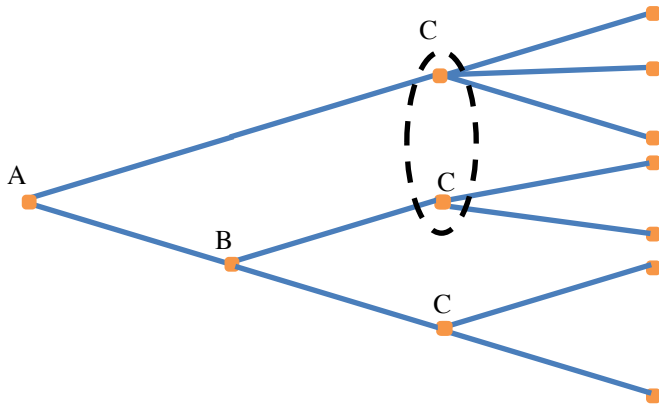
PART A: shorter questions

QUESTION 1 (10 POINTS)

a) Consider the extensive form game below with players A, B and C. How many strategies does player C have? (7 points)



b) Look at the extensive form below with players A, B and C. Is it ok to draw the information set the way I did? Explain why/why not! (3 points)



QUESTION 2 (10 points)

Look at the two-player simultaneous-move game below (player 1's payoffs are listed before player 2's).

		Player 2	
		A	B
Player 1	A	4, 10	10, 4
	B	10, 4	4, 10

- Find the Nash equilibrium/a, you may use mixed strategies. (4 points)
- Compare the simultaneous-move game above to a sequential version of the game where player 1 moves first and player 2 then observes player 1's move before choosing A or B. What is the subgame perfect equilibrium? (4 points)
- How do the equilibrium payoffs differ between the two versions of the game? (2 points)

QUESTION 3 (10 POINTS)

Consider the following two-player simultaneous move-game. What strategy profiles are pure strategy Nash equilibria of this game? Briefly explain how you find the equilibria.

		Column			
		W	X	Y	Z
Row	A	73,83	10,20	-4,8	0,84
	B	60,50	60,65	-10,15	0,30
	C	60,10	8,18	-5,20	0,0
	D	10,20	60,0	-9,2	0,30
	E	0,0	0,0	200,0	1,1

QUESTION 4 (10 POINTS)

Consider the two-player simultaneous-move game shown below where $X < 2$. By how much does the probability that Player 1 plays A change when X increases from -1 to 1 ? Explain your result.

		Player 2	
		A	B
Player 1	A	$X, 1$	$2, 0$
	B	$2, 0$	$1, 1$

PART B: Longer questions

QUESTION 5 (28 POINTS)

Consider a town with only two Paella restaurants called Los Cucalos and Nautilus. Both restaurants serve Paella and they can choose whether to charge a high or a low price. The high price gives a profit margin of 10 SEK per customer served and the low price gives a profit of 8 SEK per customer. Each restaurant has a loyal customer base of 1,000 customers that visit them once a week irrespectively of the price charged. There is also a floating demand of 2,000 customers per week who all go to the restaurant that charges the lowest price. If both restaurants charge the same price, they will get 1,000 of these customers each.

(A) (7 POINTS) Draw the payoff matrix for the simultaneous-move price-setting game and determine the Nash equilibrium.

(B) (7 POINTS) Explain why the game in (A) is a Prisoners' Dilemma game.

(C) (7 POINTS) Now suppose Nautilus has a larger loyal customer base of 5,000 (rather than 1,000) customers per week. Profit margins and the floating demand remain the same. Draw the payoff matrix for this game and find the Nash equilibrium. Is this game still a Prisoners' Dilemma game?

(D) (7 POINTS) How does the existence of a large loyal clientele for Nautilus solve the dilemma? Relate your answer to other examples where similar resolutions of social dilemmas are plausible.



QUESTION 6 (32 POINTS)

The small country Utopia, with a population of N citizens, has an aggressive neighbour country Jeltland. Utopia has a volunteer defence force where citizens can choose to participate or not. The individual benefit to all Utopians (everybody gets the same benefit) if n citizens volunteer is $B(n)=2n$. We can think of the benefit as the level of security that the citizens feel from the reduced risk of invasion by Jeltland (a larger defence force works as a deterrent). The cost to a volunteer from serving in the armed forces, if n citizens are participating, is $C(n)=60-n$. Assume that all N citizens could volunteer if they chose to.

(A) (8 POINTS) Draw a diagram showing the payoff of not volunteering when n other people are volunteering. Plot the payoff on the vertical axis and n on the horizontal axis. Use the same diagram to also show the payoff from volunteering.

(B) (8 POINTS) Gudrun, a citizen of Utopia, notes that 32 other citizens have volunteered. Does Gudrun volunteer or not? Explain why.

(C) (8 POINTS) How many will volunteer in the Nash equilibrium/equilibria that you can find? If there is more than one Nash equilibrium, explain when each might occur.

(D) (8 POINTS) Discuss the strategic situation above and relate to other similar situations discussed in the course. How could Utopia make sure that they have a large volunteer force? Try to relate this discussion to Sweden (or some other small country in the world).

Note that you can answer part (D) of this question even if you have not successfully solved (A) to (C), but make be sure to state any additional assumptions you need to make in order to answer (D).