Queen Mary
University of London

January Examination Period 2022-23

ECN361: Advanced Microeconomics *Duration: 2 hours*

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Answer all questions.
Cross out any answers that you do not wish to be marked.

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Calculators are permitted in this examination. Please state on your answer book the name and type of machine used. Complete all rough workings in the answer book and cross through any work that is not to be assessed.

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Question 1
Give a *concise* answer to the following questions.

a) What are *pooling* equilibria and what are *separating* equilibria in signalling games as introduced in the lecture?

b) Explain the following statement: in the Akerlof lemons market introduced in the lecture, inefficiencies are not caused by incomplete information but due to asymmetric access to information.

c) What is the *no distortion at the top* property of contracts under adverse selection? Explain in words why optimal contracts have this property. [*Hint: What is the reason for distortions below the top?*]

[30 marks]

Question 2
Consider the following two-player stage game:

		Player 2 A	Player 2 B
Player 1	A	$4, 4$	$0, 10$
	B	$10, 0$	$3, 3$

a) Find the set of Nash equilibria of the stage game.

b) Suppose the players play the stage game repeatedly for 20 rounds and their total payoff is the sum of all stage-game payoffs (without discounting). What is the highest stage-game payoff player 1 can achieve in round 1 of any subgame perfect equilibrium? Justify your answer.

Suppose for the rest of this Question that the stage game is repeated infinitely and future payoffs are discounted with factor $\delta \in (0, 1)$.

c) What is the lowest value $\bar{\delta} \in (0, 1)$ such that the following strategy profile is a subgame perfect equilibrium whenever $\delta \geq \bar{\delta}$?
- In $t = 1$, play (A, A).
- In $t > 1$, play (A, A) if (A, A) was played in all previous rounds; play (B, B) otherwise.

d) Suppose δ is strictly lower than the value $\bar{\delta}$ from (c). Explain why there is no subgame perfect equilibrium in which (A, A) is played in all rounds. The maxmin payoff for either player is 3. Thus, 3 is the lowest possible payoff one player can force upon the other in the stage-game. The Nash reversion (or grim trigger) strategy profile above achieves this harshest possible punishment because the payoff of the stage-game Nash equilibrium gives each player their minmax payoff. Thus, no other strategy profile could possibly punish deviations with a lower continuation payoff. Therefore no punishment can deter the players from deviating from A, A when $\delta < 6/7$.

Consider the following strategy profile:
- In $t = 1$, play (B, A).
- In $t > 1$, play (A, B) if (B, A) was played in $t-1$; play (B, A) if (A, B) was played in $t-1$; play (B, B) otherwise.

e) Draw an automaton that represents the above strategy profile.

f) For what levels of $\delta \in (0, 1)$ is the above strategy profile a subgame perfect equilibrium? Interpret your finding in relation to part (c): which strategy profile is easier to support as SPE and why?

[35 marks]

Question 3
Consider an insurance market in which the customer can choose whether or not to make a non-verifiable effort to prevent falling ill. A healthy customer has a utility of $u(y)$, where y is their wealth after any payments she makes and receives. An ill customer enjoys a utility of $u(y-d)$. If the customer makes an effort to stay healthy, her utility is $u(y)-c$ if healthy and $u(y-d)-c$ if ill. The probability of developing an illness is $\bar{p}=10\%$ if no preventive effort is made, and $\underline{p}=5\%$ if preventive effort is made.
Assume that $u(w)=\sqrt{w}$, $y=10000$, $d=8400$ and $c=2$.

a) Describe verbally the concepts of ex-ante and ex-post asymmetric information. Which corresponds to Moral Hazard and which corresponds to Adverse Selection? Which situation do you find here if the insurance company cannot observe the effort? Give an example in an insurance context where the other situation is found.

b) Determine the maximal expected utility that a person can achieve without getting insurance. Would an uninsured person make an effort or not?

Consider a risk-neutral monopolistic insurance company. The insurance company offers a contract consisting of a premium P paid by the customer in any case and a compensation A paid to the customer only in case of illness.

c) Derive the optimal insurance contract assuming that the company **does not want** the customer to make a preventive effort. Use your knowledge from the lecture.

d) Take the following steps to derive the optimal insurance contract assuming that the company **wants** to induce the customer to make a preventive effort.

   (i) Set up the maximisation problem of the insurance company.

   (ii) Describe the objective and the constraints in the problem.

   (iii) Use your knowledge from the lecture to argue which constraints are binding and derive the solution.

e) Which of the two contracts in (c) and (d) is better for the insurance company? Considering the outcome under this contract, what inefficiency arises in comparison to the outcome we would get if the customer's effort were verifiable?

[35 marks]

End of Paper

End of Examination/ Jan Knoepfle