HAND IN

Answers recorded on exam paper

QUEEN'S UNIVERSITY FINAL EXAMINATION
FACULTY OF ARTS AND SCIENCE
DEPARTMENT OF ECONOMICS

ECON 212 (ASO), 001 – Ludovic Auger
August 3rd, 2022

INSTRUCTIONS TO STUDENTS:
This examination is 3 HOURS in length.
There are 2 sections to this examination.
Please answer all questions in the exam.
If you require more space, there is extra space at the end of the exam. Just be clear where your answers are.
For the long answer questions, show **ALL** your work. No points will be given if you do not.
There are 10 multiple choice questions (worth 20% combined) and 6 long answer questions (worth 80% combined).
The exam is out of 100 points.

The following aids are allowed:
Casio FX-991 calculator

GOOD LUCK!

PLEASE NOTE:
Proctors are unable to respond to queries about the interpretation of exam questions.
Do your best to answer exam questions as written.

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Multiple Choice Section (2pts each)

1- Which statement best describes what doing comparative statics means in the context of a demand function?

a. Looking at what happens to quantity demanded when we change one of the endogenous variables keeping every other variable constant.
b. Looking at what happens to quantity demanded when we change one of the exogenous variables keeping every other variable constant.
c. Looking at what happens to quantity supplied when we change one of the endogenous variables keeping every other variable constant.
d. Looking at what happens to quantity supplied when we change one of the exogenous variables keeping every other variable constant.

2- Which of the following best describes what a Leontief production function is?

a. A Leontief production function is a production function that requires each input to be of the right proportion.
b. A Leontief production function is a production function that multiplies each input together.
c. A Leontief production function is a production function that adds each input together.
d. A Leontief production function is a production function that takes at most one input.

3- Let's consider the following 3 production function: (i) $Y=x_1^{0.75}x_2^{0.5}$, (ii) $Y=x_1^{0.25}x_2^{0.25}$, and (iii) $Y=x_1^{0.3}x_2^{0.8}$. Which of the following functions have increasing return to scale?

a. (i) and (ii).
b. (i) and (iii).
c. (ii) and (iii).
d. (i), (ii), and (iii).
e. (i).
f. (ii).
g. (iii).

4- Consider a firm under these four scenarios: (i) The firm is a monopolist, (ii) the firm is in a duopoly under Cournot, (iii) the firm is in a duopoly under Stackleberg where the firm is the first mover, and (iv) the firm is in a duopoly under Stackleberg where the firm is the second mover. Which statement is the most accurate?

a. Profit(i)≥Profit(ii) ≥Profit(iii) ≥Profit(iv)
b. Profit(i)≥Profit(iii) ≥Profit(iv) ≥Profit(ii)
c. Profit(i)≥Profit(iv) ≥Profit(iii) ≥Profit(ii)
d. Profit(i)≥Profit(iii) ≥Profit(ii) ≥Profit(iv)

5- Which statement best represents what the risk premium of a lottery is?

a. The risk premium is the minimum difference between the expected value of the lottery and the payoff of a sure thing that would make the decision maker indifferent between the lottery and the sure thing.
b. The risk premium is the maximum difference between the expected value of the lottery and the payoff of a sure thing that would make the decision maker indifferent between the lottery and the sure thing.
c. The risk premium is the average difference between the expected value of the lottery and the payoff of a sure thing that would make the decision maker indifferent between the lottery and the sure thing.
d. None of the above.

6- Which of the following is not considered to be a sunk cost?

a. A restaurant has been built at a cost of $500,000.
b. An entrepreneur is considering building a restaurant for $500,000.
c. A restaurant owner currently spent $100,000 worth of equipment in the last 5 months.
d. A restaurant owner spent $250,000 on advertising last year.

7- Which of the following best describes what an equilibrium is?

a. An equilibrium is a condition that is reached eventually in any market.
b. An equilibrium is a state that will continue indefinitely as long as the exogenous factors remain unchanged.
c. An equilibrium is a temporary state.
d. An equilibrium is a concept that is often meaningless because most markets never reach equilibrium.

8- Thinking of game theory, which of the following best describes what a dominant strategy is?

a. A dominant strategy is the strategy of the dominant player.
b. A dominant strategy is a strategy that is better for a player than any other the player might choose, regardless of the other player's strategy.
c. A dominant strategy is a strategy that is better for both players no matter what any of the players might use as a strategy.
d. A dominant strategy is a strategy that guarantees a Nash equilibrium that maximizes benefits for both players.

9- Consider a firm with increasing returns to scale. Which of the following best describes the optimal output for the firm if it wants to maximize profit?

a. The firm should produce as much output as possible, ideally infinitly.
b. There is an optimal amount of output for the firm, and we can solve for it.
c. There is an optimal amount of output for the firm, but we cannot solve for it.
d. The firm should produce as much output possible, ideally infinity, and we can solve for it.

10- Which of the following is not a characteristic of a perfectly competitive market?

a. The industry is characterized by equal access to resources.
b. The industry is fragmented.
c. The industry produces many similar but differentiated product.
d. Consumers have perfect information about prices.

Long Answer Questions

1- (9pts) Ludo is a risk neutral farmer growing coffee beans on his lands. It is known that growing coffee beans requires an optimal amount of sunshine and water. In the summer, if the weather is good then Ludo will be able to sell $150,000 worth of coffee. If the weather is bad, on the other hand, Ludo will only be able to sell $100,000 worth of coffee. Ontario weather is not great to grow coffee so Ludo expects the weather to be good with a 30% probability and bad with a 70% probability.

   a. (3pts) Suppose Ludo can buy insurance with an associated premium of $15,000 that will allow him to sell his coffee at a total price of $125,000. Should Ludo buy this insurance policy?

b. (3pts) Should he buy the insurance if instead it allows him to sell the coffee at a total price of $130,000? What about $140,000?

c. (3pts) If the insurance allows Ludo to sell the coffee at a total price of $135,000, what is the actuary fair insurance premium?

2- (15pts) Suppose there are only two teams in the NHL: The Toronto Maple Leaf and the Montreal Canadian. Both teams are interested in adding one player during the free agency. Each team has the choice between two positions: a forward or a defense man. Both teams would prefer if the other team chose a player of the other position as if both teams pick the same position, then the price for the player will go up.

		Montreal	
Toronto		Forward	Defenseman
	Forward	(50,40)	(75,60)
	Defenseman	(25+x,60)	(30,40)

a. (2pts) Does Montreal have a dominant strategy? (explain)

b. (3pts) The Toronto General Manager would really like a forward. What is the maximum value x can take such that Toronto picking a Forward is a dominant strategy?

c. (3pts) Letting x=10, if they exist find all Pure Strategy Nash equilibrium or explain why there are none.

Now suppose both teams can also pick a goalie. The new matrix payoff is as followed:

		Montreal		
Toronto		Forward	Defenseman	Goalie
	Forward	(50,40)	(75,60)	(75,50)
	Defenseman	(60,60)	(40,50)	(60,50)
	Goalie	(70,60)	(70,60)	(30,30)

d. (2pts) Does Toronto have any dominated strategy?

e. (2pts) Does Montreal have any dominated strategy?

f. (3pts) If they exist find all Pure Strategy Nash equilibrium or explain why there are none.

3- (21pts) Consider a duopoly market between two pharmaceutical companies, Piller and Moderning, producing vaccines against Covid. For simplicity, let's assume that both vaccines are exactly the same from the consumer's perspective (i.e. it is NOT a differentiated product). The inverse market demand is given by $P=1000-(5q_p+2q_m)$ where q_p and q_m are the quantity of vaccines being produced by Piller and Moderning, respectively. Piller is a bigger company and as such has a cost of only 45 to produce its vaccine while Moderning has a cost of 60. For each of the equilibrium you will be asked to solve, you need to find the equilibrium price as well as the equilibrium quantities for each of Piller and Moderning.

   a. (6pts) Solve for the Cournot equilibrium.

b. (5pts) Assuming Piller moves first, solve for the Stackleberg equilibrium.

c. (5pts) Compute the profits for both Piller and Moderning from the Cournot equilibrium solved in part a) as well as the profits for both Piller and Moderning from the Stackleberg equilibrium solved in part b. Compared the results.

d. (5pts) Now, assume Moderning was not able to develop a vaccine and as such Piller has a monopoly. Solve for the Monopoly equilibrium, compute Piller's profit and compare your results with part b and c.

4- (6pts) Let Q be the number of car being produced using B bodies and W wheels. Every car needs exactly 4 wheels for one Body.
   a. (3pts) Draw the isoquants for the car production.
   b. (3pts) Write a mathematical expression for the production of the cars.

5- (11pts) Consider a setting where Ludo and Alina are the only two people consuming coffee. Ludo has an inverse demand curve of $P=15-3Q_L$ while Alina has an inverse demand curve of $P=20-4Q_A$.

a. (3pts) Derive the market demand curve for Q^M as a function of P, where Q^M is the total demand from all consumers.

b. (4pts) For what values of Q^M will only one person consume coffee? Will it be Ludo or Alina?

c. (4pts) Draw a graph of the demand curve with Q^M on the horizontal axis, and P on the vertical axis. Label both the intercepts and the kink point in the demand curve.

6- (18pts) Let's think of the gasoline car industry. Let the market supply curve be given by $Q_s=300+100P_s$ and the market demand curve by $Q_d=50{,}000-150P_d$.

a. (4pts) Solve for the equilibrium market price and quantity.

b. (4pts) What is the consumer and producer surplus in the market equilibrium?

c. (7pts) Suppose the government impose a quota of 10,000 cars. What will be the price charged to consumers? What are the new consumer and producer surplus and what is the dead weight loss? Compare your answers with part (b).

d. (3pts) What is the minimum quantity for a quota that will make a quota not binding?

(Extra Space)

(Extra Space)