BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

MSc ECONOMICS

ADVANCED MICROECONOMICS (MEC 501)

EXAMINATION **DURATION: 3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. **Answer any three questions from section B**
2. **Answer any four (4) questions**
3. **The paper carries six questions**
4. **All questions carry equal marks of 25 each**
5. **The use of cellphones is not allowed in the exam**

MAR 2024

Question 1

Chovy Investments and Kaltech Investments are duopolists granted an annual license by the Zimbabwean government to supply unlimited quantities of LP gas in Zimbabwe in 2019. The duopolists can raise their profits by colluding to maintain high market price. If they do this they each make a profit of RTGS$7 million. The dilemma for the duopolists is that if one of them cheats on the agreement by lowering their price, the cheat's profits rise to RTGS$10 million while the other loses customers to the cheat and the profits fall to RTGS$3 million. If both firms cheat by cutting price, neither firm gains customers from the other and the profits of both firms fall to RTGS$5 million.

(a) Express this game both in normal form and in extensive form. **(6 marks)**

(b) Determine the pure strategies Nash equilibrium of the game **(6 marks)**

(c) Show that the pure strategies Nash equilibrium is sub-optimal from the perspective of the duopolists. **(6 marks)**

(d) Present reasons why the outcome in (b) might not persist if the duopolists know that their licenses will be renewed for the next 20 years due to their political connections. **(7 marks)**

[25 marks]

Question 2

Assume that a monopolist has a constant marginal cost of \$3 and faces a demand curve given by:

$$Q = 280 - P$$

(a) Determine the monopolist's:

i) Profit maximizing price quantity combination. **(2 marks)**

ii) Profits. **(1 mark)**

(b) Suppose that a second firm enters the market. Let q_1 be the output for the first firm and q_2 be the output for the second firm such that:

$$Q = q_1 + q_2$$

i) Assuming the second firm has a constant marginal cost of \$4, use the Cornout model of duopoly to determine the profit maximizing level of production for each firm as well as the market price. **(6 marks)**

ii) Calculate each firm's profits. **(2 marks)**

iii) Prove that the outcome under Cornout competition is suboptimal from the perspective of the two firms. **(4 marks)**

iv) Propose the ratios that the firms should produce if they were to cooperate in terms of the quantities that they should produce. **(4 marks)**

v) Give the rationale why the form of cooperation that is proposed in (iv) would not hold if this game was played in the short-run. **(6 marks)**

[25 marks]

Question 3

Consider Anesu who has the following Cobb-Douglas utility function:

$$U = X_1^{\alpha} X_2^{\beta}$$

where $\alpha + \beta = 1$

Anesu has a total income of M, and the prices of X_1 and X_2 and P_1 and P_2, respectively.

(a) Derive her utility maximizing combination of X_1 and X_1. **(5 marks)**

(b) Determine the share of income that is spent on X_1. **(3 marks)**

(c) Derive the Marshallian and Hicksian demand functions for X_1. **(8 marks)**

(d) Derive her indirect utility function. **(4 marks)**

(e) Derive her expenditure function. **(5 marks)**

[25 marks]

Question 4

Consider the following extended prisoner's dilemma game:

		Prisoner 2		
		Confess	Don't confess	Run away
Prisoner 1	Confess	-5, -5	0, -6	-5, -10
	Don't confess	-6, 0	-1, -1	0, -10
	Run away	-10, -6	-10, 0	-10, 0

(a) Determine whether Prisoner 1 has strictly dominated strategies. **(5 marks)**

(b) Determine the weakly dominated strategies in this game . **(5 marks)**

(c) By using iterated elimination of weakly dominated strategies, solve the Nash equilibrium of this game. **(8 marks)**

(d) Explain whether Prisoner 1's choice of strategy depends on whether Prisoner 2 is rational or not. **(7 marks)**

[25 marks]

Question 5

The market for high-quality caviar is weather dependent. If the weather is good, there are many fancy parties and caviar sells for $30 per pound. In bad weather it sells for only $20 per pound. Caviar produced one week will not keep up until the next week. A small caviar producer has a cost function given by:

$$C = 0.5q^2 + 5q + 100$$

where, q is weekly caviar production. Production decisions must be made before the weather (and the price of caviar) is known, but it is known that good weather and bad weather occur with a probability of 0.5.

(a) How much caviar should this firm produce if it wishes to maximize the expected value of its profits? **(5 marks)**

(b) Suppose the owner of the firm has a utility function of the form:

Utility $= \pi^{0.5}$

where, π is weekly profits.

Determine the expected utility associated with the output strategy defined in part (a).

(3 marks)

(c) Can this firm owner obtain a higher utility of profits by producing some output other than that specified in parts (a) and (b)? Explain. **(7 marks)**

(d) Suppose this firm could predict next week's price but could not influence that price. What strategy would maximize expected profits in this case? What would expected profits be?

(10 marks)

[25 marks]

— end —