BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

MSc ECONOMICS

NOV 2024

ADVANCED MICROECONOMICS (MEC 501)

EXAMINATION **DURATION: 3 HOURS**

INSTRUCTIONS TO CANDIDATES

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

Question 1

Derick derives utility from martinis (m) in the proportion to the number he drinks:

$$U(m) = m.$$

Derick is particular about his martinis, however: He only enjoys them made in the exact proportion of two parts gin (g) to one part vermouth (v). Hence we can write Derick's utility function as:

$$U(m) = U(g, v) = \min(\frac{g}{2}, v)$$

(a) Show that regardless of the prices of the two ingredients, Derick will never alter the way he mixes martinis. (6 marks)

(b) Calculate the demand functions for gin and vermouth. (8 marks)

(c) Using the results from (b), derive Derick's indirect utility function. (6 marks)

(d) Calculate Derick's expenditure function; for each level of P_g and P_v. *Hint: Because this problem involves a fixed proportions utility function, you cannot solve for utility-maximizing decisions using calculus.* (5 marks)

[25 marks]

Question 2

Suppose the utility function for goods x and y is given by:

$Utility = U(x, y) = xy + y$

(a) Calculate the uncompensated (Marshallian) demand functions for x and y. (5 marks)

(b) Describe how the demand curves for x and y are shifted by changes in income or the price of the other good. (5 marks)

(c) Calculate the expenditure function for x and y. (5 marks)

(d) Use the expenditure function calculate in (c) to compute the compensated demand functions for goods x and y. (5 marks)

(e) Describe how the compensated demand curves for x and y are shifted by changes in income or in the price of the other good. (5 marks)

[25 marks]

Question 3

Maria has \$1 she can invest in two assets, A and B. A dollar invested in A has a 50-50 chance of returning \$16 or nothing and in B has a 50-50 chance of returning \$9 or nothing. Maria's utility over wealth is given by the function:

$U(W) = \sqrt{W}$

(a) Suppose the asset's returns are independent.

(i). Despite the fact that A has much higher expected return than B, show that Maria would prefer to invest half her money in B, rather than investing everything in A (5 marks).

(ii). Let α be the fraction of the dollar she invests in A. Determine the value of a she would choose. (5 marks)

(b) Now suppose the assets' returns are perfectly negatively correlated: When A has a positive return, B has nothing and vice versa.

(i). Show that Maria is better off investing half her money in each asset now that when the assets' returns were independent. (7 marks)

(ii). If she can choos how much to invest in each, show that she would choose to invest a greater fraction in B than when the assets' returns were independent. (8 marks)

[25 marks]

Question 4

Intel and Advanced Micro Devices (AMD) are the only firms that produce central processing units (CPUs), which are the brains of personal computers. Both because the products differ physically and because of Intel's Intel Inside advertising campaign has convinced some consumers of its superiority, customers view the CPUs as imperfect substitutes. Consequently, the two firms' inverse demand functions differ as follows:

$p_A = 197 - 15.1\ q_A - 0.3\ q_I$

$p_I = 490 - 10\ q_I - 6\ q_A$

Where price is dollars per CPU, quantity is in millions of CPUs, the subscript *I* indicates Intel, and the subscript *A* represents AMD. Each firm faces a constant marginal cost of, MC = \$40, and there are no fixed costs. The firms compete as Cournot duopolists.

(a) Determine each firm's best response function **(9 marks)**

(b) Solve for the Nash-Cournot equilibrium quantities **(8 marks)**

(c) Determine each firm's profits **(8 marks)**

[25 marks]

Question 5

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

[25 marks]

Question 6

The game of chicken is played by two macho teens that speed toward each other on a single lane road. The first to veer off is branded the chicken, whereas the one who does not veer gains peer group esteem. Of course if neither veers, both die in the resulting crash. Payoffs to the chicken game are provided in the following table.

		Teen 2	
		Veer	Don't veer
Teen 1	Veer	2, 2	1, 3
	Don't veer	3, 1	0, 0

(a) Present the game in extensive form. (2 marks)

(b) Determine the pure strategy Nash equilibrium or equilibria. (2 marks)

(c) Compute the mixed strategy Nash equilibrium. (6 marks)

(d) Suppose the game is played sequentially, with Teen 1 moving first and committing to this action by throwing away the steering wheel. Write down the normal form and extensive forms of the sequential version of the game.

(i). What are teen 2's contingent strategies? (4 marks)

(ii). Using the normal form of the sequential version of the game, solve for the Nash equilibria. (4 marks)

(iii). Identify the proper sub-games in the extensive form of the sequential version of the game. (4 marks)

(iv). Use backward induction to solve for the Sub-game Perfect Nash Equilibrium. (3 marks)

[25 marks]

END OF PAPER