

Sample Final Exam**(To be discussed in class on August 13)**

Note: This examination consists of two parts. **Part A** consists of short (true/false) questions, and carries a weight of 20 points. **Part B** carries the balance of the weight (80), and contains essays and problems. **In all cases (including true/false), good and accurate graphs are required when appropriate.** Mathematical derivation is frequently required as well. Please allocate the available time accordingly. *If writing with lead pencils, make sure they are 2B or darker.*

Part A: True/false section

1. (20 points, five each) Answer any **four** of the following by stating if the statement is true, false or uncertain, and by explaining your choice briefly. No credit is given for an answer without explanation.
 - (a) For a competitive firm in the short- run, *producer surplus* and *profit* are the same thing.
 - (b) The LMC, and hence the long-run supply of a competitive firm cannot be U-shaped if production is subject to constant returns to scale.
 - (c) The efficiency losses due to a monopoly (vis-à-vis competition) can be fully measured by the loss of consumer surplus alone.
 - (d) Given that a monopolist has decreasing average costs, setting the price equal to average cost will lead to too much output in comparison to the competitive output.
 - (e) A risk-averse person will always buy insurance if it is available.
 - (f) Consider a monopolist with constant marginal cost, who faces a demand curve with constant price elasticity and does not practice price discrimination. If the government imposes a tax of \$2 per unit of goods sold by the monopolist, then the monopolist will increase its price by more than \$2 per unit.

Part B: 80 points. Do any **four** of the following.

2. Suppose that there are two duopoly firms producing a homogeneous product. Their cost functions are assumed to be given by, $c_1 = 5y_1$ and $c_2 = 5y_2$, where y_1 and y_2 are the outputs for firm-1 and firm-2, respectively, while c_1 and c_2 denote their total costs. Price is determined by the market demand curve,

$$Y = 53 - p, \quad \text{where } Y = y_1 + y_2.$$

- (a) Determine mathematically the Cournot equilibrium price for each firm using the reaction functions. (8 points)
- (b) Determine mathematically the Stackelberg equilibrium solution. Is it advantageous for a firm to enter the industry first? Why? (6 points)

c) Suppose the two firms form a cartel to maximise joint profit. Determine mathematically the total output that would be produced. Is the combined cartel profit higher than that in part (a) or (b)? Explain. (6 points)

3. Consider an exchange economy where the two goods are “silken tofu”(x₁) and “blue fin tuna” (x₂). The economy has 100 and 50 units of these two goods, respectively, and each of the two consumers (Mel and Michelle) are equally possessed of these delicacies. The preferences are however different, for Mel, $U(x_1, x_2) = (x_1 + x_2)$, while for Michelle, $U = (x_1 + 2x_2)$. [Hint: the indifference curves are linear here.]

(a) Draw the indifference curves for Mel and Michelle in a “box” diagram. Calculate the level of utility enjoyed by these persons at their respective initial endowments. (6 points)

(b) Explain the set of Pareto efficient allocations in this economy. Graph it. (6 points)

(c) Is the initial allocation (i.e., endowment) Pareto efficient? Determine a likely price ratio that may allow the economy to reach a point on the efficient set. What would be the level of utility in the new situation? Does one gain more than another? Explain. (8 points)

4. Suppose that two strategies are available to each of the two competitors: to co-operate, C, or not to co-operate, N. The payoff matrix is given as follows:

Payoff Matrix for Firm-1

		Firm-1's Strategy	
		C	N
Firm-2's Strategy	C	450	506.5
	N	337.5	400

Payoff Matrix for Firm-2

		Firm-1's Strategy	
		C	N
Firm 2's Strategy	C	450	337.5
	N	506.5	400

(a) Does this game have any Nash equilibrium? (Explain fully; otherwise no credit will be awarded). (10 points)

(b) Explain whether it is a “Prisoner’s Dilemma” type of problem. If it is, what is the strategy that should be taken to avoid the dilemma? Explain. (10 points)

5. John is earning an annual income of \$40,000 and his utility of wealth function is given by

$$U(w) = w^{1/2}$$

John suffers from arthritis and there is a 50% probability that an operation costing \$17,000 will be needed this year.

- (a) Is John risk-neutral, risk-averse, or risk-lover? Explain fully with a graph. (8 points)
- (b) What is the maximum amount John would be willing to pay for a full-coverage insurance policy? Explain. (6 points)
- (c) What is the minimum amount the insurance company would accept for such a policy? Explain. (6 points)