

ECO 2145 – MICROECONOMIC THEORY II

FINAL EXAMINATION

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NOTE: You have the right to use a calculator. No reference to textbooks or other reference materials is permitted.

TRUE/FALSE (30 points). Indicate whether the statement is true, false or uncertain, and provide short explanation. Your grade is based on the quality of your explanation.

1. Whenever monopolists produce less output than in a perfectly competitive market, the monopoly outcome is inefficient.
2. A firm that engages in third-degree price discrimination with capacity constraints will allocate its capacity so that the price charged is the same for all market segments.
3. At the Cournot-Nash equilibrium of a duopolistic homogeneous product market, the outcome is efficient.
4. When the prisoner's dilemma game is repeated a large number of times, prisoners do not cooperate during the early periods of the game.
5. Suppose that a risk averse individual is given the choice between a lottery, with expected value A , or a certain income, with value B . The risk averse individual chooses the lottery if $A > B$.
6. A Dutch (or descending-price) auction never generates greater income for the seller than does an English (or ascending-price) auction.
7. In economies with only private goods and no externalities, competitive equilibrium allocations are always efficient.
8. Consider an economy with production and two firms (A, B) and two factors of production – labour (L) and capital (K). Suppose that $MRTS_{L,K}^A = \frac{2L_A}{K_A}$ whereas $MRTS_{L,K}^B = \frac{L_B}{4K_B}$. Is it possible that at a competitive equilibrium, both firms use the same quantities of labour and capital?
9. Consider a duopolistic market in which the two firms have different production technologies: one has 'older' technology and is a 'dirtier' firm. Both firms produce carbon dioxide emissions along with their output of widgets. The total social cost of carbon dioxide emissions is $SC(E) = 0.02E^2$, where E is the total quantity of emissions. To correct the externality, a higher emission tax should be imposed on the 'dirty' firm than on the 'clean' firm.
10. Since public goods are of benefit to all citizens, the cost of providing public goods should be shared equally amongst them.

PROBLEMS (60 points). Please solve the following problems. Show all of your work.

11. Consider a monopolist who produces a product sold on two markets. The inverse demand function in the first market is $P_1 = 400 - 4Q_1$ and in the second market $P_2 = 240 - 2Q_2$. The cost function can be written as $C(Q) = 40Q + 0.5Q^2 + F$, where $Q = Q_1 + Q_2$.
- Assume that the firm cannot price discriminate between the two markets. What is the firm's optimal output for each market, and at what price is the output sold?
 - Assume that the firm can practice price discrimination. What is the firm's optimal output for each market, and at what price is the output sold?
 - Which outcome is more efficient? Explain your answer.
12. Consider a firm which manufactures tablet computers. The firm faces the inverse demand curve $P = 200 - 0.5Q$ and has the total cost function $C(Q) = 50 + 0.25Q$. Suppose that the firm can use a block-pricing structure, with two price blocks.
- Given an arbitrary choice of Q_1 , find the optimal quantity (and price) for the second block.
 - Given your answer to (a), find the optimal two-block tariff structure.
 - How does the average price paid under the block tariff compare to the average price paid under uniform monopoly? (You just need to provide an explanation – no calculations are required.)
13. Air Canada (AC) and West Jet (WJ) both fly between Ottawa and Edmonton. Their demand curves are given by:

$$Q_{AC} = 1000 - 2P_{AC} + P_{WJ}$$
$$Q_{WJ} = 1000 - 4P_{WJ} + 2P_{AC}.$$

Assume that the marginal cost per passenger is \$20.

- Find the prices and quantities at the Bertrand-Nash equilibrium.
- Assume that Air Canada is the Stackelberg leader; find the equilibrium prices and quantities.
- Assume that the market for flights between Ottawa and Edmonton is a homogeneous product market, and that Air Canada and West Jet compete in quantities, rather than prices. Assuming that $P_{AC} = P_{WJ}$, find the Cournot-Nash equilibrium.
- Do these equilibrium outcomes differ? If so, why?

14. Consider the following game in normal form, which describes the market for extraction of iron ore, in which Rio Tinto and BHP Biliton operate. They each have existing facilities; Rio Tinto can undertake a modest expansion, whereas BHP Biliton can undertake either a modest or major expansion.

		Rio Tinto	
		No expansion	Modest expansion
BHP Biliton	No expansion	\$1,013, \$1,013	\$844, \$1,125
	Modest expansion	\$1,125, \$844	\$900, \$900
	Major expansion	\$1,013, \$506	\$675, \$450

- a. If this is a simultaneous game, what is the Nash equilibrium?
 - b. Rewrite the game in extensive form, assuming that BHP Biliton can move first. Find the subgame-perfect equilibrium.
 - c. Rewrite the game in extensive form, assuming that Rio Tinto can move first. Find the subgame-perfect equilibrium.
 - d. Explain the difference – if any – between the equilibria found in (a), (b) and (c).
15. Assume that your income is \$120,000 annually. You own a home, and your possessions are worth \$50,000. There is a probability of 0.01 that your home will be burglarized, and you will lose all of your possessions. Your utility function is $U = I^{1/2} + 0.05W$ where I denotes income and W denotes the value of your possessions.
- a. What would you be prepared to pay for full insurance, i.e., for insurance that replaced all of your possessions, and did not charge a deductible?
 - b. How would your purchase of insurance be affected if you were to be charged a deductible of \$100? (You don't have to work out all of the math: just explain how your purchasing decision will change.)
16. Consider an economy with two types of individuals – A, B. There are N_A individuals of type A and N_B individuals of type B. There are two consumption goods: Xboxes (x) and yams (y). Type A individuals each have an endowment of 10 Xboxes; type B individuals each have an endowment of 15 yams. The utility of type A individuals is expressed as: $U^A(x_A, y_A) = x_A^{1/3} x_B^{1/2}$; the utility of type B individuals is expressed as: $U^A(x_A, y_A) = x_A^{1/3} x_B^{1/2}$; the utility of type B individuals is expressed as: $U^B(x_B, y_B) = x_B^{1/2} x_B^{1/3}$.
- (a) Calculate the general equilibrium of this economy.
 - (b) Show how the price of Xboxes will change if the number of individuals of type A increases. Can you explain this result?