HE1001 Microeconomics

Final Practice 3 – Problems

Academic Year 2025/2026, Semester 1

Quantitative Research Society @NTU

November 17, 2025

Instructions:

- This practice examination contains **3 questions** worth a total of **100 marks**.
- Answer **all questions**.
- Show all working clearly. Partial credit may be awarded for correct methods.
- Write your answers in the spaces provided or on additional paper as needed.
- Calculators are permitted.
- Time allocation: approximately 2 hours.

Question 1: Multiple Choice Questions [30 marks]

Select the correct option for each of the following questions. Each question is worth 5 marks.

1.1 [Adapted from Tutorial 1, Question 3] **[5 marks]**

The demand function for product X is given by $Q_X = 100 - 2P_X + 0.5P_Y + 0.01I$, where P_X is the price of X, P_Y is the price of good Y, and I is consumer income.

Using this demand function, determine whether goods X and Y are substitutes or complements:

(A) Substitutes, because the coefficient on P_Y is positive.

(B) Complements, because the coefficient on P_Y is positive.

(C) Substitutes, because the coefficient on P_Y is negative.

(D) Complements, because the coefficient on P_Y is negative.

1.2 [Adapted from Tutorial 2, Question 1] **[5 marks]**

Consider a competitive market with the following data (per year):

Price ($/unit)	**Quantity Demanded**	**Quantity Supplied**
5	1,000	400
10	800	600
15	600	800
20	400	1,000

What is the equilibrium price and quantity?

(A) $P = \$10$, $Q = 700$ units

(B) $P = \$12.50$, $Q = 700$ units

(C) $P = \$15$, $Q = 700$ units

(D) Cannot determine from the given data

1.3 [Adapted from Tutorial 3, Question 1] **[5 marks]**

John consumes good X with utility function $U(X) = 4X^{0.5}$. The price of X is $P_X = \$2$ per unit, and John's income is $I = \$100$.

What is John's budget constraint?

(A) $2X = 100$

(B) $4X^{0.5} = 100$

(C) $X = 50$

(D) Both (A) and (C)

1.4 [Adapted from Tutorial 5, Question 2] **[5 marks]**

Which of the following behaviours is inconsistent with standard economic rationality assumptions?

(A) A consumer maximizes utility subject to a budget constraint.

(B) A person values \$100 received today more than \$100 received one year from now.

(C) An individual refuses a small gamble with positive expected value due to loss aversion.

(D) A firm produces where marginal revenue equals marginal cost.

1.5 [Adapted from Tutorial 7, Question 1] **[5 marks]**

A competitive firm has total cost $C(q) = 200 + 2q^2$, where q is output. The market price is $P = \$20$. What is the firm's profit-maximizing output?

(A) $q = 5$

(B) $q = 10$

(C) $q = 15$

(D) $q = 20$

1.6 [Adapted from Tutorial 9, Question 2] **[5 marks]**

A firm's demand is $P = 500 - 2Q$. Currently $P = 300$, $Q = 100$, and marginal cost $MC = 0$. If the firm increases output slightly, what happens to profit?

(A) Profit increases, because price exceeds marginal cost.

(B) Profit decreases, because marginal revenue is less than marginal cost.

(C) Profit remains unchanged, because the firm is already maximizing profit.

(D) Profit increases, because total revenue increases.

Question 2: Multiple Choice Questions with Justification [30 marks]

Select the correct option and provide a brief justification for your answer. Each question is worth 10 marks (5 marks for correct answer, 5 marks for justification).

2.1 [Adapted from Tutorial 4, Question 6] **[10 marks]**

Which of the following is true at each point along a price-consumption curve (PCC)?

(A) Income is constant, and the price of one good varies.

(B) Income varies, and all prices are constant.

(C) Both income and prices vary proportionally.

(D) Utility is constant.

Justification:

2.2 [Adapted from Tutorial 5, Question 6] **[10 marks]**

A firm uses labour (L) to produce output (q). When labour usage is $L = 12$ units and output is $q = 36$ units, which of the following statements must be true?

(A) Average product of labour (APL) is 3.

(B) Marginal product of labour (MPL) is 3.

(C) Both APL and MPL equal 3.

(D) Cannot determine without more information.

Justification:

2.3 [Adapted from Tutorial 7, Question 10] **[10 marks]**

In a perfectly competitive market in long-run equilibrium, which of the following conditions must hold for each firm?

(A) $P = MC = \min(ATC)$

(B) $P = MC > \min(ATC)$

(C) $P = MR > MC$

(D) $P < MC = \min(ATC)$

Explain why firms earn zero economic profit in long-run equilibrium.

Justification:

Question 3: Structured Problems [40 marks]

Answer all parts of each question. Show all working clearly.

3.1 [Adapted from Tutorial 1, Question 7] **[13 marks]**

The domestic market for corn has demand $Q_d = 1{,}000 - 200P$ and supply $Q_s = -200 + 400P$, where Q is in millions of bushels and P is in dollars per bushel.

(a) Find the equilibrium price and quantity without government intervention. [3 marks]

(b) Calculate consumer surplus and producer surplus at equilibrium. [4 marks]

(c) Suppose the government sets a price floor at $P_f = \$2.50$ per bushel. Find the new quantity demanded, quantity supplied, and the size of the surplus. [3 marks]

(d) Calculate the deadweight loss caused by the price floor. [3 marks]

3.2 [Adapted from Tutorial 4, Question 2] **[14 marks]**

Bobby has \$500 of income each semester to spend on books and pizzas. The price of books is $P_B = \$50$ per book, and the price of pizza is $P_P = \$10$ per pizza. Bobby's utility function is $U(B, P) = B^{0.5}P^{0.5}$.

(a) Write Bobby's budget constraint and find the optimal consumption bundle (B^*, P^*). [5 marks]

(b) Derive Bobby's individual demand function for books as a function of the price of books P_B, holding income and the price of pizza constant. [4 marks]

(c) Now suppose Bobby's income increases to \$600. Find the new optimal consumption bundle. [3 marks]

(d) Using the results from parts (a) and (c), derive Bobby's Engel curve for books (relationship between income and quantity of books). [2 marks]

3.3 [Adapted from Tutorial 10, Question 3] **[13 marks]**

Consider an ultimatum game between two players, Player 1 (the proposer) and Player 2 (the responder). Player 1 is given \$10 and must propose a split: $(x, 10 - x)$, where x is the amount Player 1 keeps and $10 - x$ is the amount offered to Player 2.

Player 2 can either accept or reject the offer. If Player 2 accepts, both players receive their proposed amounts. If Player 2 rejects, both players receive \$0.

(a) Using backward induction, what is the subgame-perfect equilibrium outcome? What split will Player 1 propose, and will Player 2 accept? [5 marks]

(b) In practice, experimental evidence shows that proposers typically offer between \$3 and \$5, and responders often reject offers below \$3. Explain why actual behaviour deviates from the theoretical prediction. [4 marks]

(c) Suppose the game is repeated 5 times with the same players, and both players know this. How might this change the equilibrium outcome? Explain briefly. [4 marks]

END OF EXAMINATION