CONCORDIA COLLEGE
MOORHEAD, MINNESOTA

- Name: _____
- Date: _____

BUSN 301: Intermediate Microeconomic Theory

Final Exam

Spring 2026

INSTRUCTIONS:

- The final exam is graded on a 100-point basis.
- Show all relevant steps and reasoning.
- Answers must be clearly written and well organized.
- Graphs, when required, must be clearly labeled, with axes, curves, and key points identified.
- If you make an assumption, state it clearly.

Problem 1. Consumer Theory **(20 points)**

Suppose that a consumer has preferences over two goods x_1 and x_2, represented by the utility function:

$$u(x_1, x_2) = 2x_1^{\frac{1}{3}} x_2^{\frac{2}{3}}$$

The prices of the two goods are $p_1 = 2$ and $p_2 = 1$, respectively, and the consumer's income is $m = 24$.

1.A. Compute the marginal utility of each good.

For the remaining questions in `Problem 1`, you may either use the marginal utilities derived in `1.A`, or use the simplified expressions $MU_1 = x_2$ and $MU_2 = 2x_1$.

1.B. Compute the marginal rate of substitution of good 1 for good 2.

1.C. Does this utility function exhibit a diminishing marginal rate of substitution (MRS)? Explain.

1.D. State the first-order condition that characterizes the consumer's optimal choice.

Problem 1. Consumer Theory (continued) **(20 points)**

1.E. Solve for the utility-maximizing bundle (x_1^*, x_2^*).

1.F. Suppose that the consumer's income increased from $m = 24$ to $m = 30$, holding prices fixed.

- Illustrate this change in a graph with budget constraints and indifference curves. A rough but clearly labeled sketch is sufficient. Be sure to label both budget constraints, the optimal bundles, the corresponding indifference curves, and the axes.
- How does the optimal consumption of each good change?
- Based on how optimal consumption changes with income, are these goods normal or inferior? Briefly explain.

Problem 2. Producer Theory **(20 points)**

Suppose that a firm produces output y using two inputs x_1 and x_2, according to the production function:

$$f(x_1, x_2) = x_1^{\frac{1}{2}} x_2^{\frac{1}{2}}$$

The prices of the two inputs are $w_1 = 4$ and $w_2 = 1$, respectively.

2.A. Explain in your own words, what the marginal product of input 1 (MP_1) represents.

For the questions in `Problem 2`, you may use the simplified expressions $MP_1 = x_2$ and $MP_2 = x_1$.

2.B. Compute the marginal rate of technical substitution of input 1 for input 2.

2.C. State the first-order condition that characterizes the producer's cost-minimizing choice of inputs.

Problem 2. Producer Theory (continued) **(20 points)**

2.D. Suppose that the producer wishes to produce $\bar{y} = 12$. Solve for the firm's cost-minimizing choice of inputs (x_1^*, x_2^*), and compute the total cost of producing $\bar{y} = 12$ using your optimal input choice.

2.E. Would you expect this firm to ever choose a corner solution (using only x_1 or only x_2) when producing any quantity of $y > 0$? Explain briefly.

Problem 3. Cost and Firm Behavior **(20 points)**

Suppose that a firm has the following total cost function:

$$c(y) = y^2 + 4y + 16$$

3.A. Compute the firm's marginal cost (MC), average total cost (ATC), and average variable cost (AVC) functions.

3.B. Suppose that the market price is $p = 20$.

- Plot the firm's cost curves (MC and ATC) on a graph. Clearly label all curves and axes.
- Indicate the profit-maximizing output level and shade the region corresponding to the firm's profit.
- Compute the firm's profit.

Problem 3. Cost and Firm Behavior (continued) **(20 points)**

3.C. Suppose that the market price decreased to $p = 6$. What level of output will the firm choose? Should the firm continue producing or shut down in the short run? Explain briefly.

3.D. Taking into account the firm's shutdown decision, write down the firm's short-run supply function.

Problem 4. Market Equilibrium and Welfare **(20 points)**

Suppose that the market demand and supply curves for a good are given by:

$$D(p) = 20 - p$$
$$S(p) = p - 2$$

4.A. Find the competitive equilibrium price and quantity.

4.B. Suppose that the government imposes a per-unit tax of $t = 4$. Find the new equilibrium quantity,the price paid by consumers and the price received by sellers after the tax.

4.C. Compute the deadweight loss created by the tax, as well as consumer surplus, producer surplus, and tax revenue.

Problem 4. Market Equilibrium and Welfare (continued) **(20 points)**

4.D. Illustrate the market before and after the tax in a supply-and-demand graph. A rough but clearly labeled sketch is sufficient. Label the original equilibrium, the after-tax equilibrium, the price paid by consumers, the price received by sellers, the tax wedge, and the axes.

4.E. How might the effects of this tax differ in the long run compared to the short run? Briefly explain.

Problem 5. General Equilibrium **(20 points)**

Suppose that there are two agents A and B, and two goods, 1 and 2, where the total endowment is fixed at $(\omega^1, \omega^2) = (10, 10)$. Suppose that the economy starts off at an initial allocation $X = (x_A^1, x_A^2, x_B^1, x_B^2) = (5, 5, 5, 5)$. Each agent's utility functions are given as:

$$u_A(x_A^1, x_A^2) = (x_A^1) \cdot (x_A^2)$$
$$u_B(x_B^1, x_B^2) = x_B^1 + 2x_B^2$$

5.A. At allocation X, do the two consumers have the same marginal rate of substitution? What does your answer imply about whether allocation X is Pareto optimal?

5.B. Would you expect a competitive equilibrium allocation in this economy to be Pareto optimal? Briefly explain.

5.C. Consider the allocation $Y = (y_A^1, y_A^2, y_B^1, y_B^2) = (6, 3, 4, 7)$. Is this allocation Pareto optimal? Explain briefly.

Problem 5. General Equilibrium (continued) **(20 points)**

5.D. Is allocation Y equitable? Explain briefly.

5.E. Starting from the equal endowment allocation X, explain how a redistribution of endowments could lead to a competitive equilibrium that is fair. Briefly describe the role of the Second Welfare Theorem.

- Score: _____
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