• Name: _____

• Date: _____

BUSN 301: Intermediate Microeconomic Theory

Quiz #1: Suggested Solutions

Spring 2026

INSTRUCTIONS:

• Each quiz is graded on a 100-point basis and contributes to your Quiz component of the course grade.

• You are expected to 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.

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Problem 1. The Budget Constraint   **(5 Points Each)**

Suppose that the prices of good 1 (x_1) and good 2 (x_2) are given as $p_1 = 4$ and $p_2 = 2$, respectively. The consumer's income is $m = 40$, and the consumer allocates income across two goods only.

1.A. Express the consumer's budget line as an equation.

$$p_1 x_1 + p_2 x_2 = m \quad \Rightarrow \quad \boxed{4x_1 + 2x_2 = 40}$$

1.B. Calculate the slope of the budget line and interpret the slope economically in terms of trade-offs between goods.

- The slope of the budget line is $-\dfrac{p_1}{p_2} = -2$.

- The slope of the budget line represents the objective trade-off between goods 1 and 2 in the market.

- It measures how many units of good 2 the consumer must give up to increase consumption of good 1 by one unit.

1.C. Suppose that the price of good 2 increases from $p_2 = 2$ to $p_2 = 4$, holding income and p_1 fixed. Describe, in your own words, what happens to the budget constraint. Does it shift or pivot? Around which intercept? In which direction?

- The budget line pivots inward, where the x_1-intercept remains constant and the x_2-intercept decreases from 20 to 10.

1.D. The figure below shows two budget lines, BL_1 and BL_2. Which budget line would you prefer to face, holding preferences fixed? Why?
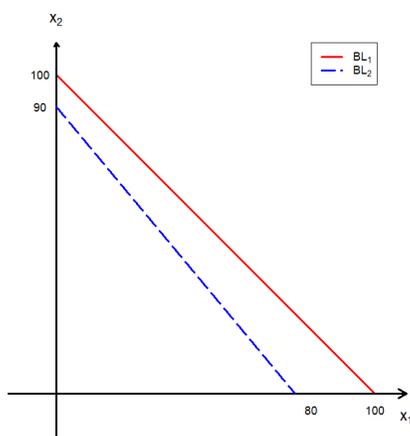
- The consumer would prefer to face BL_1, as the budget set under BL_1 encompasses the budget set under BL_2.

- This means that a consumer facing BL_1 can choose all bundles that are feasible under BL_2, plus additional bundles.

Problem 2. Preferences and Utility   **(5 Points Each)**

Suppose a consumer has rational preferences over two goods, x_1 and x_2.

2.A. In your own words, explain what an indifference curve represents.

- An indifference curve plots all bundles of goods 1 and 2 that a consumer prefers equally.
- If any two bundles are on the same indifference curve, the consumer must find the two bundles indifferent to each other.

2.B. Give an example of a situation in which preferences might fail to be monotone. Explain briefly.

- Satiation: If the consumer has a bliss point, where additional consumption of a good beyond said point is undesirable.
- Bads: If any item in the bundle is a bad, so that any amount of consumption is undesirable.

2.C. What does it mean for a utility function to be an ordinal representation of preferences? What kinds of transformations preserve the same preferences?

2.D. The figure below shows two possible indifference curves, IC_1 and IC_2. Which indifference curve is consistent with convex preferences? Explain.
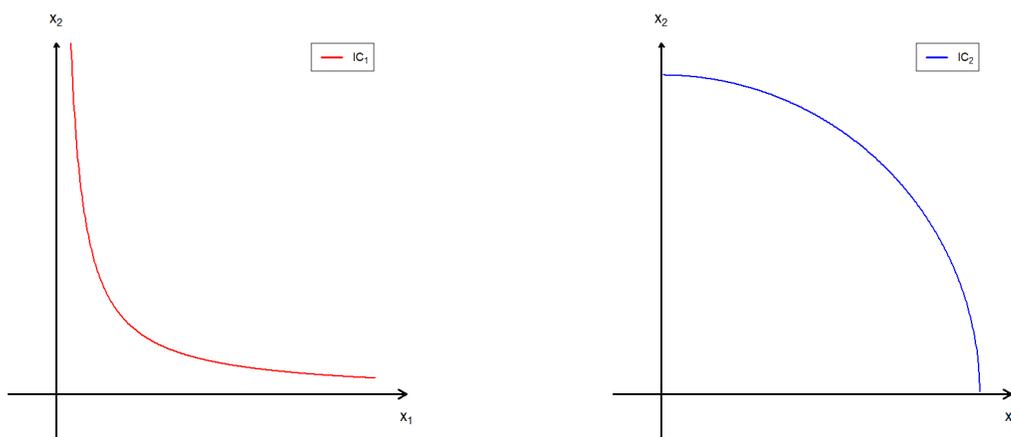
Problem 3. The Utility Maximization Problem I   **(6 Points Each)**

Suppose a consumer's preferences over two goods, x_1 and x_2, are represented by the utility function $u(x_1, x_2) = 2x_1^2 x_2$. The prices of goods 1 and 2 are given by $p_1 = 5$ and $p_2 = 10$, respectively, and the consumer's income is $m = 150$.

3.A. Compute the marginal utility of good 1 and the marginal utility of good 2.

3.B. For the purposes of this and following questions in Problem 3, assume that the marginal utilities are given by $MU_1 = 2x_2$ and $MU_2 = x_1$. Derive the marginal rate of substitution.

3.C. State the first-order condition that characterizes the consumer's optimal choice.

3.D. Write down the consumer's budget constraint.

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

Problem 4. The Utility Maximization Problem II   **(6 Points Each)**

Suppose a consumer's preferences over two goods, x_1 and x_2, are represented by the utility function $u(x_1, x_2) = x_1 + 2x_2$. The prices of goods 1 and 2 are given by $p_1 = 5$ and $p_2 = 10$, respectively, and the consumer's income is $m = 150$.

4.A. Compute the marginal utility of good 1 and the marginal utility of good 2.

4.B. For the purposes of this and following questions in Problem 4, assume that the marginal utilities are given by $MU_1 = 10$ and $MU_2 = 20$. Derive the marginal rate of substitution.

4.C. State the condition that characterizes the consumer's optimal choice.

4.D. Write down the consumer's budget constraint.

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

Problem 5. Extra Credit: Dual Constraints   **(5 Points)**

Suppose that a student is planning a spring break trip. They have already packed all necessary items except for two goods: sunscreen (S) and lotion (L). The student's preferences over these two goods are represented by the utility function $u(S, L) = min\{S, 2L\}$. The prices of sunscreen and lotion are given by $p_S = 8$ and $p_L = 7$, respectively, and the student's income is $m = 112$. In addition to the budget constraint, the student faces a carry-on weight restriction imposed by the airline. Each unit of sunscreen weighs $w_S = 3$, and each unit of lotion weighs $w_L = 4$. The airline's maximum allowable carry-on weight is $W = 24$. For the purpose of this problem, assume that students are allowed to purchase and carry fractional units of both sunscreen and lotion. Find the student's optimal choice (S^*, L^*).

- Original Score: _____

- Original Date: _____

- Recovered Score: _____

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