Monmouth COLLEGE

- Name: _____
- Date: _____
- Section: _____

ECON 300: Intermediate Price Theory

Problem Set #3

Fall 2024

Problem 1. Utility Maximization: Cobb-Douglas

Suppose that a consumer's utility function $u(\cdot)$ over two goods x and y is given as:

$$u(x, y) = x^2 y^3$$

The consumer's budget is \$100, and the unit price of good x is \$5, and the unit price of good y is \$4.

1.A. Find the marginal utility of good x.

1.B. Find the marginal utility of good y.

1.C. Find the marginal rate of substitution between goods x and y.

1.D. Find the formal expression for the consumer's budget constraint.

1.E. Find the optimal ratio of goods x and y the consumer should purchase to maximize their utility.

Problem 1. Utility Maximization: Cobb-Douglas (continued)

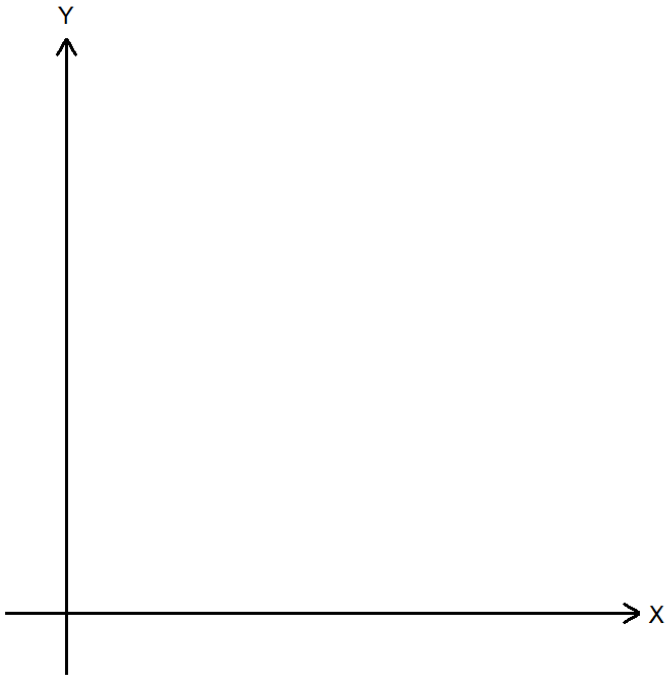
Suppose that a consumer's utility function $u(\cdot)$ over two goods x and y is given as:

$$u(x, y) = x^2 y^3$$

The consumer's budget is \$100, and the unit price of good x is \$5, and the unit price of good y is \$4.

1.F. Find the optimal bundle that the consumer should purchase to maximize their utility.

1.G. Plot (A) the consumer's budget constraint, and (B) the consumer's indifference curve that passes through the bundle that maximizes their utility in the empty chart below. The graph need not be to scale, but you must label all of the following items:



- The budget line.
- The indifference curve.
- The x and y intercepts for the budget constraint.
- The utility maximizing bundle of goods.

Problem 2. Utility Maximization: Linear

Suppose that a consumer's utility function $u(\cdot)$ over two goods x and y is given as:

$$u(x, y) = 2x + 3y$$

The consumer's budget is \$50, and the unit price of good x is \$1, and the unit price of good y is \$2.

2.A. Find the marginal utility of good x.

2.B. Find the marginal utility of good y.

2.C. Find the marginal rate of substitution between goods x and y.

2.D. Find the formal expression for the consumer's budget constraint.

2.E. Find the optimal ratio of goods x and y the consumer should purchase to maximize their utility.

Problem 2. Utility Maximization: Linear (continued)

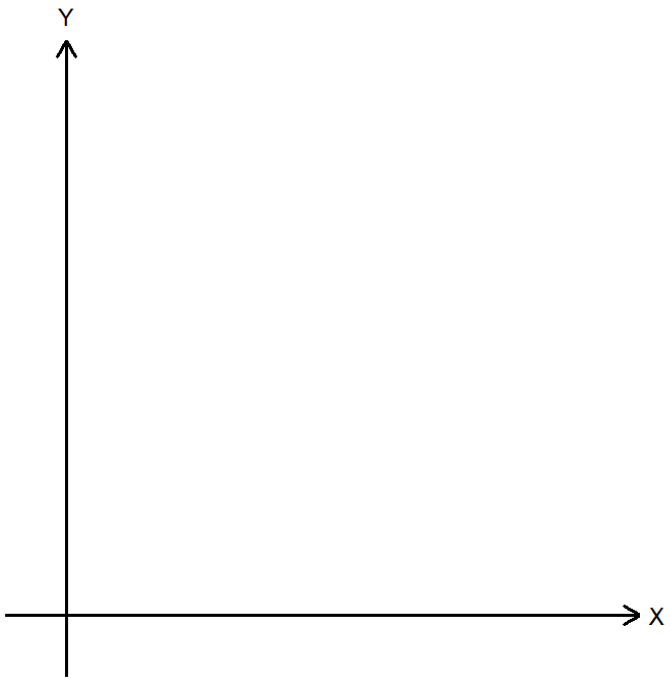
Suppose that a consumer's utility function $u(\cdot)$ over two goods x and y is given as:

$$u(x, y) = 2x + 3y$$

The consumer's budget is \$50, and the unit price of good x is \$1, and the unit price of good y is \$2.

2.F. Find the optimal bundle that the consumer should purchase to maximize their utility.

2.G. Plot (A) the consumer's budget constraint, and (B) the consumer's indifference curve that passes through the bundle that maximizes their utility in the empty chart below. The graph need not be to scale, but you must label all of the following items:



- The budget line.
- The indifference curve.
- The x and y intercepts for the budget constraint.
- The utility maximizing bundle of goods.

Problem 3. Utility Maximization: Leontief

Suppose that a consumer's utility function $u(\cdot)$ over two goods x and y is given as:

$$u(x, y) = min\{2x, y\}$$

The consumer's budget is \$100, and the unit price of good x is \$3, and the unit price of good y is \$4.

2.A. Find the marginal utility of good x.

2.B. Find the marginal utility of good y.

2.C. Find the marginal rate of substitution between goods x and y.

2.D. Find the formal expression for the consumer's budget constraint.

2.E. Find the optimal ratio of goods x and y the consumer should purchase to maximize their utility.

Problem 3. Utility Maximization: Leontief (continued)

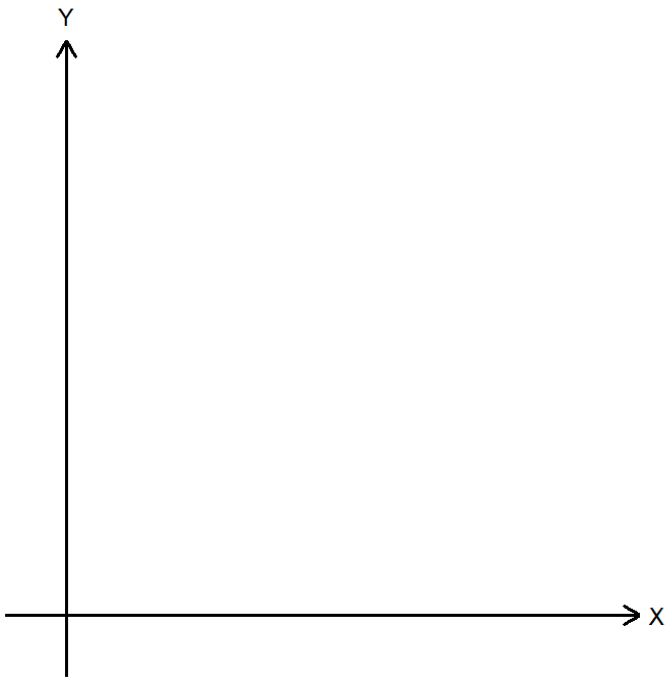
Suppose that a consumer's utility function $u(\cdot)$ over two goods x and y is given as:

$$u(x, y) = min\{2x, y\}$$

The consumer's budget is \$100, and the unit price of good x is \$3, and the unit price of good y is \$4.

2.F. Find the optimal bundle that the consumer should purchase to maximize their utility.

2.G. Plot (A) the consumer's budget constraint, and (B) the consumer's indifference curve that passes through the bundle that maximizes their utility in the empty chart below. The graph need not be to scale, but you must label all of the following items:



- The budget line.
- The indifference curve.
- The x and y intercepts for the budget constraint.
- The utility maximizing bundle of goods.

- Score: _____
- Extra Credit: _____