Monmouth COLLEGE

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

ECON 300: Intermediate Price Theory

Problem Set #1

INSTRUCTIONS:

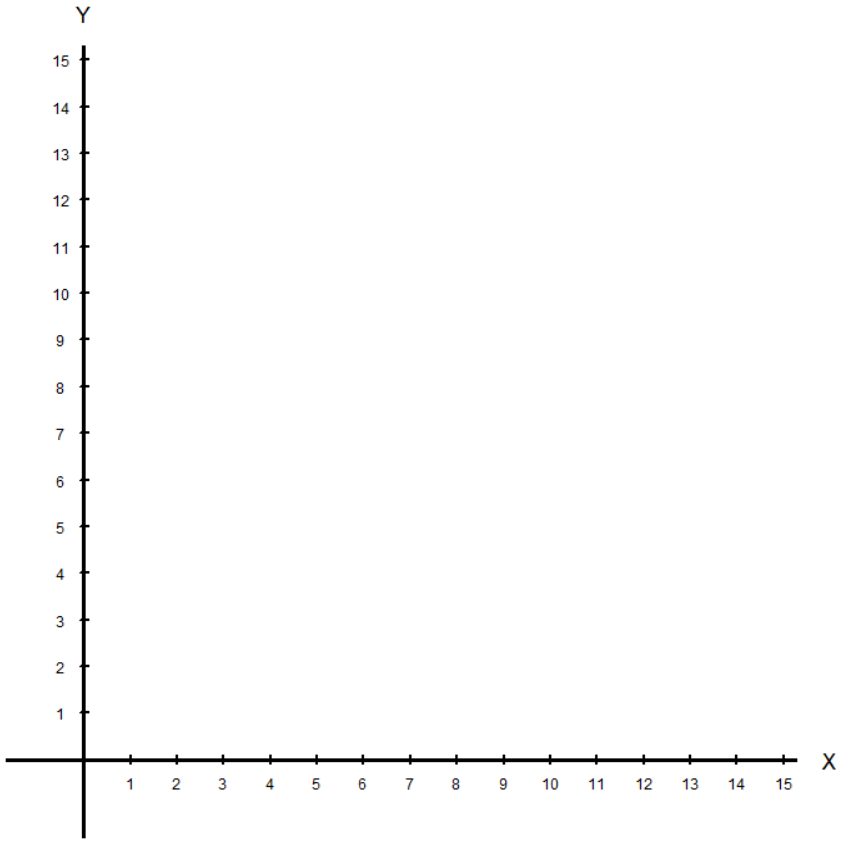
- This problem set is not graded.

Problem 1. The Budget Constraint

Suppose that the consumer is participating in a market consisting of goods x and y. Good x costs \$3, and good y costs \$2 for each unit. The consumer has \$30 as their income, that they will exhaust on consuming goods x and y.

1.A. Express the consumer's budget constraint as a mathematical equation.

1.B. Plot the consumer's budget line in the diagram below.



1.C. Calculate the slope of the budget line.

1.D. Assuming the consumer is currently consuming bundle $(x, y) = (6, 10)$. Finish the statement:

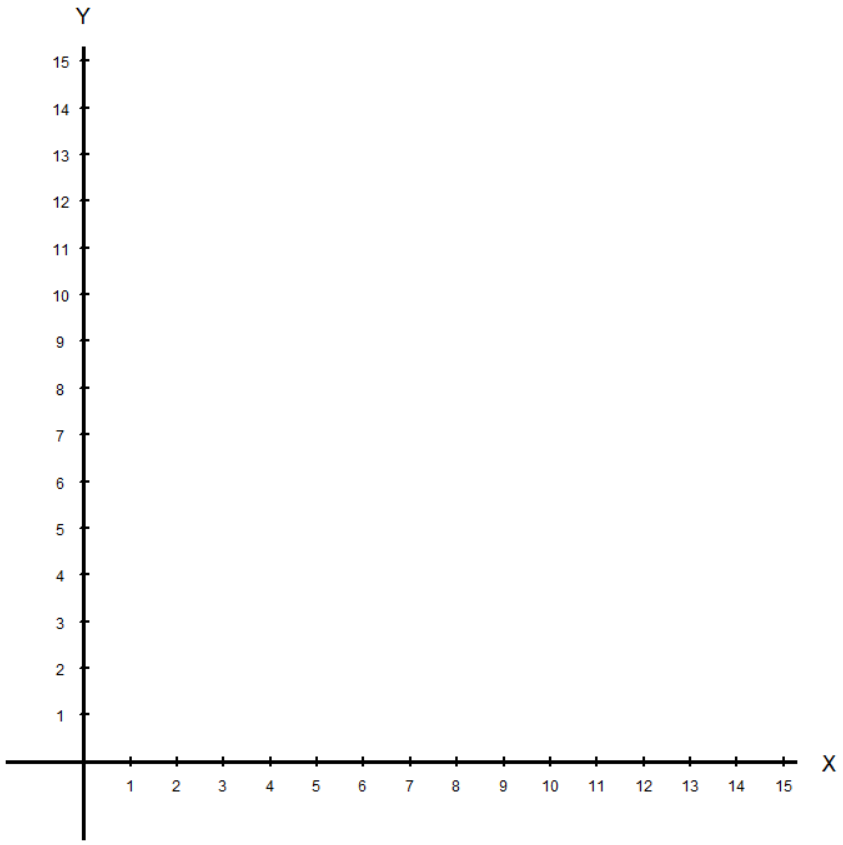
"The consumer must give up _____ units of good y to purchase 1 extra unit of good x."

1.E. In your own words, define the following terms:

- The Budget Set

- The Budget Line

1.G. Assuming the all other market conditions are identical to the beginning of **Problem 1**, plot the consumer's budget line if the market price of good x falls to \$2.



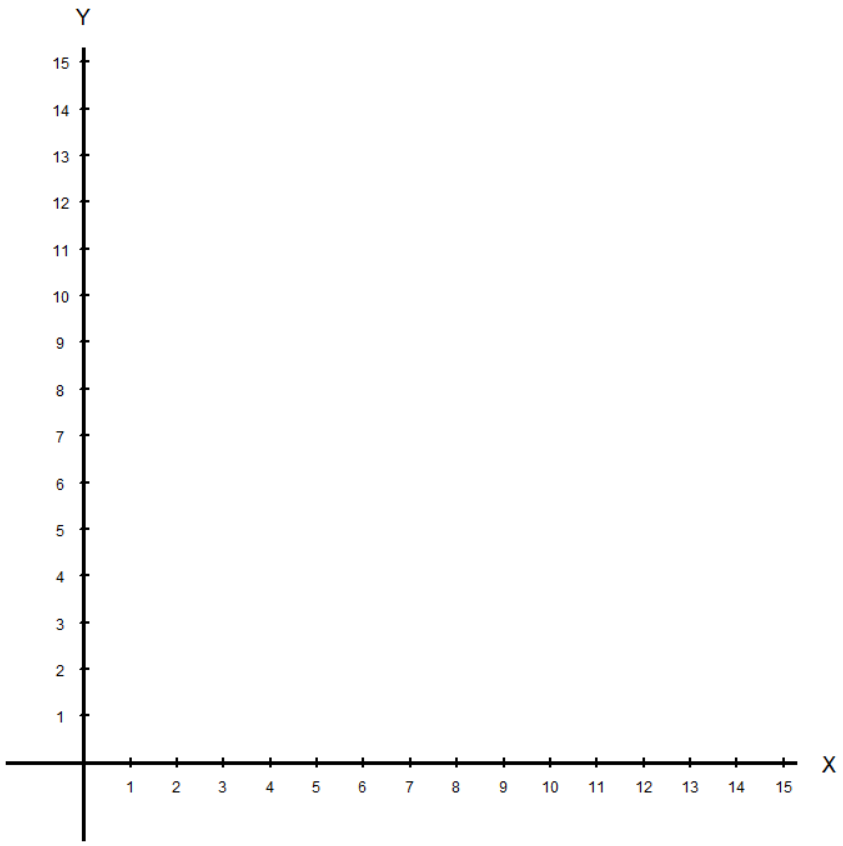
Problem 2. Utility and Indifference Curves

Suppose that the consumer is participating in a market consisting of goods x and y. The consumer's utility function is given as:

$$u(x, y) = xy$$

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

2.B. Plot 4 bundles that will provide the consumer with 12 utility, and approximate the indifference curve representing 12 utility.



2.C. Find the expression for the marginal rate of substitution (MRS).

2.D. Calculate the MRS for the consumer that is consuming bundle $(x, y) = (4, 3)$.

2.E. Assuming the consumer is currently consuming bundle $(x, y) = (4, 3)$. Finish the statement:

"The consumer is willing to give up _____ units good y to consume 1 extra unit of good x."

2.F. If we believe that the goods x and y are perfect substitutes, is the current utility function an appropriate choice? If not, what would be a suitable utility function?

Problem 3. The Utility Maximization Problem

Suppose that the consumer is participating in a market consisting of goods x and y. Good x costs \$3, and good y costs \$2 for each unit. The consumer has \$30 as their income, that they will exhaust on consuming goods x and y. The consumer's utility function is given as:

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

3.A. Find the marginal utility of x.

3.B. Find the marginal utility of y.

3.C. Find the optimal ratio of goods x and y for this consumer.

3.D. Find the optimal quantity of good x for this consumer.

Problem 4. The Utility Maximization Problem

Suppose that the consumer is participating in a market consisting of goods x and y. Good x costs \$3, and good y costs \$2 for each unit. The consumer has \$30 as their income, that they will exhaust on consuming goods x and y. The consumer's utility function is given as:

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

4.A. Find the marginal utility of x.

4.B. Find the marginal utility of y.

4.C. Comparing the per dollar marginal utility of good x and y, determine which good the consumer should purchase.

4.D. Find the optimal quantity of good x for this consumer.

Problem 5. The Utility Maximization Problem

Suppose that the consumer is participating in a market consisting of goods x and y. Good x costs \$3, and good y costs \$2 for each unit. The consumer has \$30 as their income, that they will exhaust on consuming goods x and y. The consumer's utility function is given as:

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

5.A. Find the optimal ratio of goods x and y for this consumer.

5.B. Find the optimal quantity of good x for this consumer.