Monmouth COLLEGE

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

ECON 300: Intermediate Price Theory

Problem Set #2: Suggested Solutions

Fall 2024

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Problem 1. Preferences

Suppose that you are analyzing the preference relation of some consumer.

1.A. You are told that the consumer's preference is "rational." What does this mean?

A preference relation is said to be rational if if satisfies the axioms of Completeness and Transitivity. Completeness requires the consumer to be able to always tell which they prefer given any two bundles. Transitivity requires the consumers preferences to not be "circular."

1.B. Can you think of any scenario when your own preferences are not "rational?" Describe.

Many examples, but the canonical example may be that if you are given two goods that you have never seen before, you truly cannot tell which one you would prefer over the other. This violates the axiom of completeness, and the preference relation cannot be rational.

1.C. You are told that the consumer's preference satisfy the axiom of convexity. What does this mean?

If the consumer's preference displays convexity, this means that the consumer would prefer a mix of different goods compared to extremely skewed bundles. For instance, the consumer would prefer a bundle of 3 cups of coffee and 3 sandwiches, compared to an extreme bundle of 6 cups of coffee and 0 sandwiches.

1.D. You are told by the consumer that "$X \succsim Y$." What does this mean?

The consumer weakly prefers bundle X over bundle Y. Or, the consumer thinks that bundle X is at least as good as bundle Y.

1.E. You are told by the consumer that "$X \sim Y$." What does this mean?

The consumer is indifferent between bundle X and bundle Y. Or, the consumer thinks that bundle X and bundle Y are equally desirable.

Problem 2. Utility

Suppose you found a suitable utility function $U(\cdot)$ that accurately represent the consumers preference relations.

2.A. You are told that $U(X) = 100$ and $U(Y) = 20$. Based on this information alone, can you conclude that the consumer prefers bundle X 5 times more than bundle Y?

No. Utility is an ordinal concept, which means that the magnitude of the numbers do not matter. It is only the "order" that matters. Recall the in-class discussion where we demonstrated that $U(x) = x$ and $U(x) = 2x$ can represent the same underlying preferences.

2.B. Suppose that consumer A tells you their utility from consuming X is 100, but consumer B tells you that their utility from consuming Y is 50. Does this mean that consumer A enjoys X more than consumer B enjoys X?

No. For the same reason as 2.A., utility is ordinal, and thus cannot be used to measure the subjective satisfaction between different individuals.

2.C. Suppose that a consumer tells you that "$X \succ Y$ and $Y \succsim Z$." Select all functions that are a valid utility function that represents their preferences.

Function	**Utility**		
$U(\cdot)$	$U(X) = 5$	$U(Y) = 5$	$U(Z) = 1$
$V(\cdot)$	$V(X) = 100$	$V(Y) = 2$	$V(Z) = 1$
$W(\cdot)$	$W(X) = 5$	$W(Y) = 4$	$W(Z) = 4$

Since $X \succ Y$, we need the utility of consuming bundle X must be strictly greater than the utility of consuming bundle Y. Then, since $Y \succsim Z$, we need the utility of consuming bundle Y must be greater than or equal to the utility of consuming bundle Z. Therefore, $V(\cdot)$ and $W(\cdot)$ are suitable candidates.

2.D. Define in your own words the definition of "marginal utility."

Marginal utility is the additional amount of utility that the consumer gets from consuming an additional unit of some good.

Problem 2. Utility (continued)

2.E. Define in your own words the definition of "marginal rate of substitution."

The marginal rate of substitution is the "subjective exchange rate." This can be interpreted as "how many units of good y is the consumer willing to give up to consume 1 extra unit of good x."

2.F. Define in your own words the definition of "law of diminishing marginal utility."

The law of diminishing marginal utility states that for each extra unit of some good consumed, the marginal utility from each unit will decrease.

2.G. Can you think of any real-world cases where the law of diminishing marginal utility is not true?

This is an open ended question, but there are probably not many examples out there...

Problem 3. Indifference Curves

Suppose a consumer's utility function is given as:

$$U(x, y) = x \cdot y$$

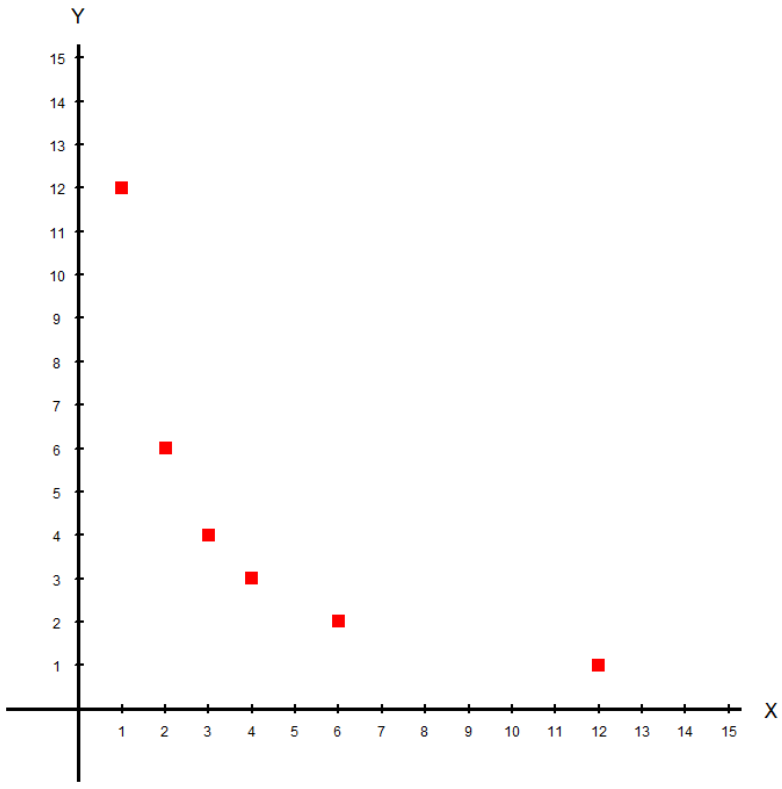
3.A. Identify the "type" of this utility function.

"Cobb-Douglas Utility Functions."

3.B. Find six bundles where the consumer's utility will be exactly 12.
(Hint: Begin with $x = 4$ and $y = 3$.)

$(x, y) = (12, 1), (6, 2), (4, 3), (3, 4), (2, 6), (1, 12)$

3.C. Plot the points you found in `3.B.` in the empty chart below.

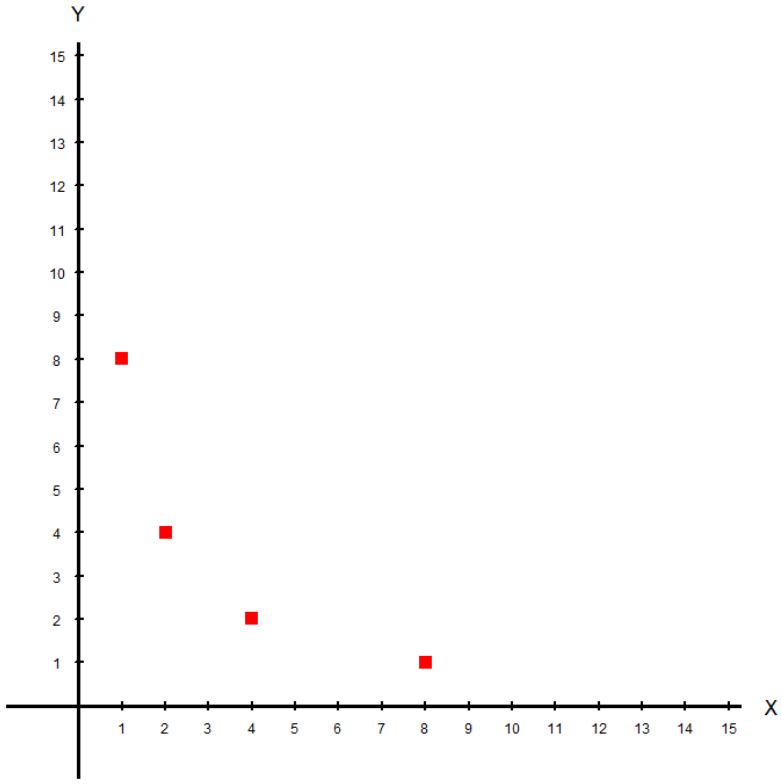


Problem 3. Indifference Curves (continued)

3.D. Find four bundles where the consumer's utility will be exactly 8.

$(x, y) = (8, 1), (2, 4), (4, 2), (1, 8)$

3.E. Plot the points you found in `3.D.` in the empty chart below.



3.F. Compare your answers for `3.C.` and `3.E.`

The bundles that consist the indifference curve representing a lower level of utility is "closer" to the origin (0,0).

Problem 4. "Special" Indifference Curves

Suppose a consumer's utility function is given as:

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

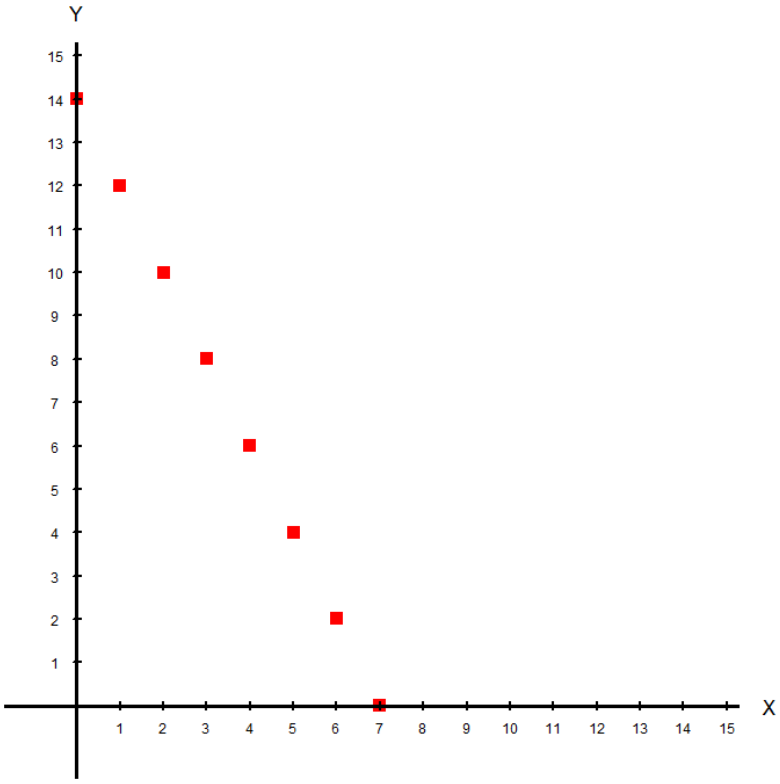
4.A. Identify the "type" of this utility function.

"Linear Utility Functions."

4.B. Find eight bundles where the consumer's utility will be exactly 14.

$(x, y) = (0, 14), (1, 12), (2, 10), (3, 8), (4, 6), (5, 4), (6, 2), (7, 0)$

4.C. Plot the points you found in `4.B.` in the empty chart below.



Problem 4. "Special" Indifference Curves (continued)

4.D. Calculate the slope of the indifference curve.

Using the standard formula, we can find that the slope of this indifference curve is always:

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{-14}{7} = -2$$

4.E. Calculate the marginal rate of substitution.

The marginal rate of substitution is the slope of the indifference curve measured at some specific point. In this special case, we know that the slope is identical regardless of which point it has been measured on, so the answer is -2.

4.F. What does the marginal rate of substitution represent?

A repeat of `2.F.`, the marginal rate of substitution measures how many units of good y is the consumer willing to give up to consume 1 extra unit of good x. So in this case, our consumer is willing to give up 2 units of good y for 1 extra unit of good x.

- Score: _____
- Extra Credit: _____