Monmouth COLLEGE

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

ECON 300

Quiz #3

Fall 2023

INSTRUCTIONS:

- Please read all questions carefully before you begin answering.
- Answer all questions in the spaces provided on the question sheet. Circle the correct answer for the multiple-choice questions.
- This quiz consists of 7 pages, including this one. There are a total of 3 problems with a total of 15 subquestions.
- This is a closed-book quiz. Please remove all materials from the top of the desk and take any necessary items from your bags before the exam begins.
- A copy of Handout #5 will be provided to assist with any tasks involving partial derivatives.
- The recovery rate for Quiz #3 is 70%.

Problem 1. The Utility Maximization Problem (40 Points)

Suppose that a consumer is participating in a market with two goods x and y. The market price of good x is \$10, and the market price of good y is \$8, and the consumer's income is \$160. The consumer's utility function is given as:

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

1.A. Find the expression for the marginal utilities for good x and good y. (5 points)

- $MU_x =$

- $MU_y =$

1.B. Find the expression for the marginal rate of substitution. (5 points)

- $MRS_{xy} =$

1.C. Find the mathematical expression for the consumer's budget constraint. (5 points)

1.D. Is there an optimal ratio of goods x and y for the consumer? (10 points)
If not, which of the two goods x and y should the consumer consume and why?

1.E. Find the optimal bundle for the consumer. (10 points)

- $x^* =$

- $y^* =$

1.F. What is the consumer's optimal bundle when income increases to \$240? (5 points)

- $x^* =$

- $y^* =$

Problem 2. Utility Maximization to the Demand Function (40 Points)

Suppose that the consumer is facing a market with good x and y. The price of good x is P_x, the price of good y is P_y, and income is M. The consumer's utility function is given as:

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

2.A. Find the expression for the marginal utilities for good x and good y. (5 points)

- $MU_x =$

- $MU_y =$

2.B. Find the expression for the marginal rate of substitution. (5 points)

- $MRS_{xy} =$

2.C. Find the mathematical expression for the consumer's budget constraint. (5 points)

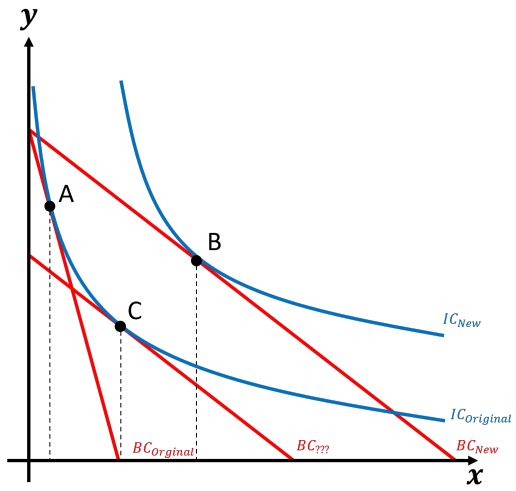
2.D. Find the optimal ratio of goods x and y. (10 points)

2.E. Find the Walrasian demand function for good x. (10 points)

2.F. Find x^* when $P_x = 20$, $P_y = 10$, and $M = 200$. (5 points)

Problem 3. Substitution and Income Effects (20 Points)

3.A. The graph below depicts a situation in which the price of good x decreased. (5 points)
Which of the following is a correct statement regarding this consumer's situation?



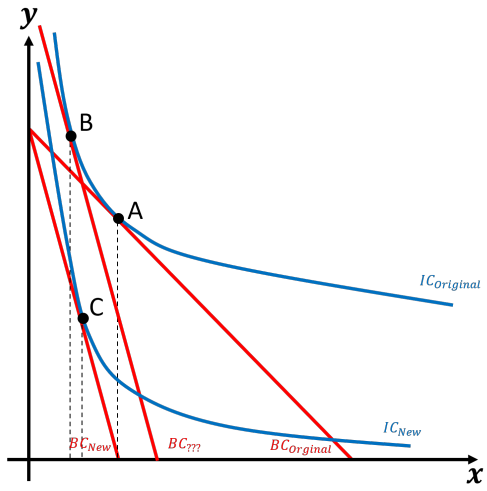
(a) The Slutsky Substitution Effect is represented by the change $A \to B$

(b) The Hicksian Substitution Effect is represented by the change $A \to B$

(c) The Slutsky Substitution Effect is represented by the change $A \to C$

(d) The Hicksian Substitution Effect is represented by the change $A \to C$

3.B. The graph below depicts a situation where the price of good x increased. (5 points)
Which of the following statements is correct?



(a) Good x is a Giffen Good.

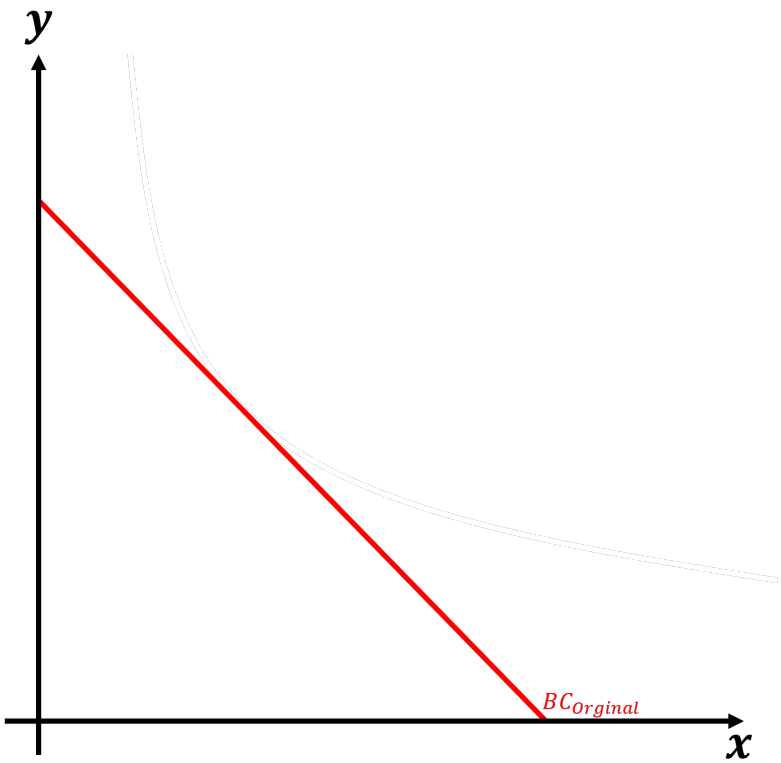
(b) The substitution effect is greater in magnitude than the income effect.

(c) The income and substitution effects act in the same direction.

(d) The diagram is relevant for finding the Slutsky substitution effect.

3.C. The figure below plots the "original" budget constraint for the consumer. (10 points) Complete the diagram by plotting and labelling the following elements assuming that good x is a normal good.

- An indifference curve of a consumer maximizing their utility under the current budget constraint ($BC_{original}$).
- The new budget line when the price of good x increases.
- The updated indifference curve of a consumer maximizing their utility under the new budget constraint.
- The budget line relevant to finding the Hicksian substitution effect.
- Indicate and label the Hicksian substitution and income effects using arrows.



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- Recovered Score: _____
- Original Date: _____
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