

Midterm 2

July 17, 2024

For full credit, please show all work.

1 Question 1

A consumer's utility function is given by $u(x, y) = \min\{x, y\}$. Initially, prices are $p_x = 1$ and $p_y = 1$, and income is 100.

- (a) Determine the consumer's optimal consumption bundle (x^*, y^*) .
- (b) Suppose the price of good x decreases to 0.5. Compute the income and substitution effects for goods x and y.

2 Question 2

Consider the decision by a consumer with an initial level of wealth, w , about how much insurance coverage to purchase. The probability of an accident is θ . In the event of an accident, the consumer takes a loss, L . Suppose the insurance premium (price per unit of coverage) is p , and let c denote the amount of coverage purchased by the consumer. The consumer's utility function is $u(x) = 1 - e^{-x}$.

- (a) Formulate the consumer's decision problem, their choice variable is c .
- (b) Solve for the optimal choice of coverage c . This should be a function of θ , p , and L .
- (c) Suppose $\theta = 0.1$ and $p = 0.1$. How much coverage will the consumer buy?

3 Question 3

1. Consider a firm that using labor, L and capital, K to produce some output, q , with the production function $f(L,K) = \ln(L) + K$. The price paid to labor is w and the price to rent capital is r .
 - (a) Set up the firm's cost minimization problem
 - (b) Solve for the firm's input demand functions, $L^*(q, w, r)$ and $K^*(q, w, r)$
 - (c) Determine the firm's cost function $c(q)$ and derive the firm's marginal cost function $\frac{\partial c(q)}{\partial q}$