

EC201 Intermediate Microeconomics

Boston University Summer Term 2

MIDTERM EXAM

JULY 25TH, 2016

Start time: 1:00PM

Duration: 2 hours

Total Points: 120 (1 point = 1 minute)

Permitted materials: Non-programmable calculator

- Please write only your BU ID on the blue books (not your name).
- If using multiple blue books, please write which questions are in each blue book on the front.

Question 1 – Preferences (10 Points)

The following are common assumptions about preferences:

- Completeness
- Transitivity
- Monotonicity
- Convexity

Consider the following scenario:

- I ask you which of the bundles $(x_1, x_2) = (2, 8)$ and $(x_1, x_2) = (8, 2)$ you prefer and you tell me you strictly prefer $(x_1, x_2) = (2, 8)$.
- I ask you which of the bundles $(x_1, x_2) = (8, 2)$ and $(x_1, x_2) = (5, 5)$ you prefer and you tell me that you strictly prefer $(x_1, x_2) = (8, 2)$.
- I ask you which of the bundles $(x_1, x_2) = (2, 8)$ and $(x_1, x_2) = (5, 5)$ you prefer and you tell me that you strictly prefer $(x_1, x_2) = (5, 5)$.

Which one of the common assumptions listed above do your choices violate and why?

Question 2 – Choice (20 Points)

Your utility function for goods 1 and 2 is:

$$u(x_1, x_2) = x_1^{\frac{2}{3}} x_2^{\frac{1}{3}}$$

The prices of goods 1 and 2 are $p_1 = 2$ and $p_2 = 1$ respectively. You have $m = 30$ income to spend.

- (i) [6 Points] Find the marginal utility for goods 1 and 2, MU_1 and MU_2 .
- (ii) [6 Points] Find the marginal rate of substitution, MRS .
- (iii) [8 Points] How much of goods 1 and 2 will you demand? Do not just write down the final answer. Derive the demand from the budget constraint and the consumer's optimality/tangency condition.

Question 3 – Demand (15 Points)

Your demand functions for goods 1 and 2 are:

$$x_1(p_1, p_2, m) = \frac{2m - 100}{p_1}$$

$$x_2(p_1, p_2, m) = \frac{100 - m}{p_2}$$

Assume that $50 \leq m \leq 100$ (this is not required to answer the question, but rather it is a technical condition so that your demand for both goods is never negative).

- (i) [3 Points] Is good 1 an ordinary or a Giffen good?
- (ii) [3 Points] Is good 2 an ordinary or a Giffen good?
- (iii) [3 Points] Is good 1 a normal good or an inferior good?
- (iv) [3 Points] Is good 2 a normal good or an inferior good?
- (v) [3 Points] Is good 1 a substitute, a complement, or neither, for good 2?

Question 4 – Intertemporal Choice (15 Points)

In this question, please draw *separate* graphs for each part (i), (ii) and (iii).

There are two periods. You receive income m_1 in period 1 and m_2 in period 2. You are able to borrow and lend at an interest rate r . There is no inflation.

- (i) [5 Points] Draw the budget constraint. Label the axis intercepts and the endowment.

Your preferences, $u(c_1, c_2)$, endowment, (m_1, m_2) , and the interest rate, r , lead to you optimally choose a consumption path (c_1, c_2) where you **save** in the first period. That is, $c_1 < m_1$.

- (ii) [5 Points] Draw your optimal choice on a graph. Show the budget constraint, endowment, the optimal choice, and the indifference curve associated with the optimal choice.

Now the interest rate r , increases.

- (iii) [5 Points] Show the change in the budget constraint on a graph. Will you be able to choose a consumption path that gives you higher utility?

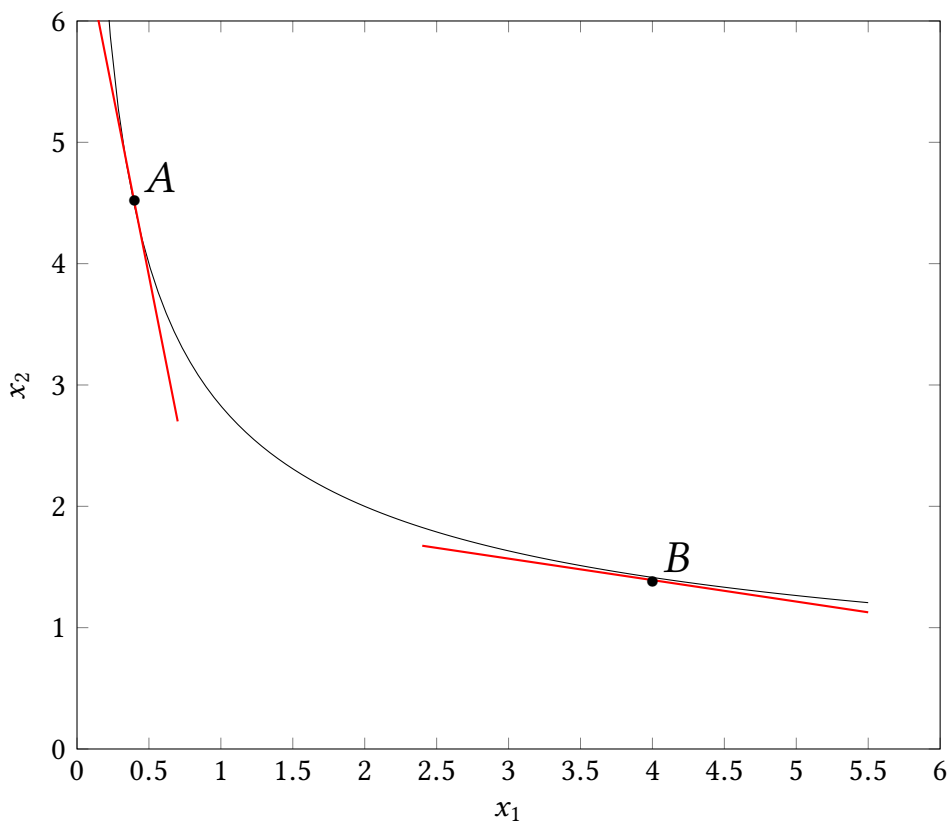
Question 5 – Uncertainty (15 Points)

You have \$20,000 in your bank account. Your car is worth \$10,000 (so altogether your wealth is \$30,000). The probability that your car will be stolen in a given year is 10%. An insurance company offers to insure your car against theft for \$1,050 per year. Your utility for wealth is $U(W) = \sqrt{W}$.

- (i) [2 Points] Are you risk averse, risk loving or risk neutral?
- (ii) [4 Points] What is your expected utility from *not* purchasing insurance?
- (iii) [4 Points] What is your expected utility from purchasing insurance?
- (iv) [2 Points] Will you purchase insurance?
- (v) [3 Points] How much would the actuarially fair insurance policy cost?

Question 6 – Technology (10 Points)

The graph below shows an isoquant for a production function $f(x_1, x_2)$.



What do the slopes of the tangents at points A and B represent? How do we interpret it?

Question 7 – Cost curves, Firm Supply and Industry Supply (20 Points)

There are 100 firms in a particular perfectly competitive industry. Each firm has the following cost function:

$$c(y) = 2y^2 + 4$$

The equilibrium price of output is p .

- (i) [3 Points] What is the variable cost function $c_v(y)$?
- (ii) [3 Points] What is the firm's fixed cost?
- (iii) [3 Points] What is the average cost function, $AC(y)$?
- (iv) [3 Points] What is the marginal cost function, $MC(y)$?
- (v) [4 Points] What is firm i 's supply function, $S_i(p)$ (the supply function for one individual firm)?
- (vi) [4 Points] What is the industry supply function, $S(p)$?

Question 8 – Equilibrium and Taxes (15 Points)

The demand and supply functions for a particular good in the market are given by:

$$D(p) = 24 - 4p$$

$$S(p) = 4 + 6p$$

- (i) **[5 Points]** Find the equilibrium price and quantity.

Now the government imposes a per-unit tax (a quantity tax) of 1 on the good.

- (ii) **[6 Points]** Find the price the buyers pay, the price sellers receive and the new equilibrium quantity.
- (iii) **[4 Points]** What portion of the tax do consumers pay and what portion of the tax do sellers pay?