Microeconomic Analysis
Professor M.Torras
Fall 2019

Problem Set #2

Instructions
(a) Answer all four questions.
(b) Unless you know how to do them on a computer, make sure to construct neat, scaled graphs using a ruler. I would recommend using graph paper.
(c) Answer each question *completely* and make sure that all your answers are in complete sentences.
(d) Type all text (aside from any appearing on hand-constructed graphs) in a clear, legible font.
(e) Staple together or otherwise securely fasten all pages.
(f) The completed problem set must be <u>handed to me</u> at the beginning of class on October 22nd. Sending me the problem set as an email attachment *would result in a one-grade reduction*, as would tardiness or failure to observe the above instructions.

Good luck!

1) Each week, Tom, Dick, and Harry select the quantity of two goods, food and clothing, that they will consume in order to maximize their respective utilities. They each spend their entire weekly income on these two goods.
   a) Suppose you are given the following information about the choices that Tom makes over a three-week period:

	Food	*Clothing*	P_F	P_C	*I*
Week1	10	20	2	1	40
Week 2	7	19	3	1	40
Week 3	8	41	3	1	65

   Did Tom's utility increase between week 1 and week 2? Between week 1 and week 3? Explain using a graph to support your answer.
   b) Now consider the following information about the choices that Dick makes:

	Food	*Clothing*	P_F	P_C	*I*
Week1	10	20	2	1	40
Week 2	6	14	2	2	40
Week 3	20	10	2	2	60

   Did Dick's utility decrease between week 1 and week 3? Does he consider food and clothing to be inferior goods? Explain, using graph.
   c. Finally, examine the following information about Harry's choices:

	Food	*Clothing*	P_F	P_C	I
Week1	12	24	2	1	48
Week 2	16	32	1	1	48
Week 3	12	24	1	1	36

Draw a budget line-indifference curve graph that illustrates Harry's three chosen bundles. What can you say about Harry's preferences? Identify the income and substitution effects that result from a change in the price of food.

2) Richard is deciding whether to buy a state lottery ticket. Each ticket costs $5, and the probability of winning payoffs is given as follows:

Probability	Return
0.50	$0.00
0.25	$4.00
0.20	$11.00
0.05	$40.00

a) What is the expected value of Richard's payoff if he buys a lottery ticket? What is the variance?
b) Assume that Richard's starting wealth (before the lottery) is $50, and his utility is defined as $U = W^{0.4}$. Is he risk averse or risk loving? Would he buy the ticket?
c) Richard has been given 50 of these lottery tickets. What is the minimum price at which he would sell them? Explain.
d) Given the price of the lottery tickets and the probability/return table, what should the state do about the lottery?

3) Suppose that two investments have the same four payoffs, but the probability associated with each payoff differs, as illustrated in the table below:

Payoff	Probability (Investment A)	Probability (Investment B)
$500	0.25	0.10
$400	0.25	0.40
$300	0.25	0.40
$200	0.25	0.10

a) Find the expected return and standard deviation of each investment.
b) Janice has the utility function $U = 5I$, where I denotes the payoff. Which investment will she choose?
c) Ricardo has the utility function $U = 5I^2$. Which investment will he choose? Explain, showing calculations.
d) Laura has the utility function $U = 5I^{(1/3)}$. Which investment will she choose? Explain, showing calculations.

4) Assume that a product is produced according to the production function $q = 10(K^{0.6}L^{0.4})$.

    a) Beginning with a capital input of 5 and a labor input of 15, show whether the marginal products of labor and capital are decreasing.

    b) Does the production function exhibit increasing, decreasing, or constant returns to scale? Show how you know.