

### Econ 301: Assignment 1

Fall 2015, Concordia University

Due: October 9, 2015, by 4:00 p.m. in Szilvia Papai's mailbox  
on the 11th floor of the Hall building

*Please show all the necessary calculations and explanations that lead to your answer. Provide your answers in the order the problems are given.*

1. (20 points) Suppose the consumer consumes two goods: pizzas and CDs. Her monthly income is  $m = \$800$ . The price of a pizza is  $p_1 = \$10$  and the price of a CD is  $p_2 = \$20$ .
  - a. Write down her monthly budget constraint. Illustrate graphically the budget set. Calculate the slope of the budget line.
  - b. Suppose the government levies a 25% tax on each CD the consumer purchases. What is the new monthly budget constraint? Draw the new budget line.
  - c. Now suppose that instead of the 25% tax on CDs each consumer pays a fixed sum of \$200 in taxes per month. What is the monthly budget constraint in this case? Draw the new budget line.
  - d. Now suppose that instead of imposing any tax, the government introduces a new policy that each consumer is allowed to eat at most 20 pizzas per month. What is the monthly budget set in this case? Illustrate the new budget set in a graph.
2. (10 points)
  - a. Consider the relation "bigger and more profitable" when comparing businesses. Is this relation transitive? Is it complete?
  - b. Consider the relation "at least as tall as" among a set of people. Is this relation transitive? Is it complete?

Explain all your answers.

3. (20 points) Azalia likes both popsicles and brownies. She is willing to substitute exactly two popsicles for each brownie. For example, Azalia is indifferent among the bundles  $(8, 0)$ ,  $(6, 1)$ ,  $(4, 2)$ ,  $(2, 3)$  and  $(0, 4)$ , where each bundle is given as  $(x_p, x_b)$ , and  $x_p$  denotes the number of popsicles, while  $x_b$  denotes the number of brownies.
  - a. Which bundles make Azalia indifferent between them and the bundle  $(0, 8)$ ? Identify a few such bundles.
  - b. Plot some of Azalia's indifference curves in a graph.
  - c. What is the MRS for these indifference curves at different points? Do these indifference curves exhibit a diminishing marginal rate of substitution?

- d. Are Azalia's preferences monotonic?
4. (25 points) Art is a history major. He has to take two courses, one in philosophy and the other in mathematics. He is relatively good at philosophy, but not so much at math. He needs to spend 1 hour studying for philosophy in order to improve his grade by one point, while he needs to spend 3 hours studying for math in order to do the same. Art has a total of 60 hours to study for the two subjects. Suppose that he would get 50 points in each course if he didn't study at all.
- We want to analyze Art's problem with consumption theory. What are the goods, prices, and income? Write down the budget constraint. Illustrate it with a graph. (Hint: consider the *improvements* on Art's grades. That is, the goods are improvements in philosophy and math, and the prices are the cost of improvement measured in hours.)
  - Art's satisfaction from his academic record is solely determined by the lower of his grades in philosophy and mathematics. For example, he is indifferent between 60 in philosophy and 70 in math, and 60 in philosophy and 60 in math. What kind of preferences does Art have over improvements in his philosophy and mathematics grades? Find a utility representation for these preferences. Derive his optimal choice of grades. Illustrate it in a graph.
  - Now suppose that Art has to pass both subjects by obtaining at least 60 points in both courses. Assuming that this is a "budget restriction," illustrate Art's new budget set in a graph. What is Art's optimal choice in this case?
5. (25 points) Jacob spends all his income on movie tickets (good 1) and magazines (good 2). His utility function can be represented by  $u(x_1, x_2) = x_1 x_2$ . His income is  $m = \$100$ . The prices are  $p_1 = \$10$  and  $p_2 = \$5$ .
- Derive Jacob's optimal consumption bundle. Show the complete calculation, and illustrate your answer graphically (draw the indifference curves and the budget constraint).
  - How would your answer change to part a. if Jacob's utility function were given by  $u(x_1, x_2) = 7x_1^2 x_2^2$ ?
  - What is Jacob's marginal utility of movie tickets when he buys 5 movie tickets and 8 magazines? Compute this marginal utility for both utility functions given above.
  - Now suppose the government levies a 25% tax on each movie ticket purchased. Derive Jacob's consumption bundle and illustrate it in the same graph that you drew in part a.
  - Would Jacob prefer a \$10 income tax (i.e., lump-sum tax) to the the 25% value tax on movie tickets? Which scenario would the government prefer? Explain your answers.