

U8216 Microeconomics and Policy Analysis
Fall 2000
Problem Set 1

1. Measure bottles of beer on the horizontal axis and bags of popcorn on the vertical axis. Draw indifference curves for the following preferences:
 - a. Tom likes to drink beer or eat popcorn equally well.
 - b. Rema likes a bottle of beer only with a bag of popcorn, and vice versa.
 - c. The more beer the better, no matter how much popcorn Alejandro has, but if he can't have more beer, he prefers to have more popcorn.
 - d. Let a bundle (b,p) represent the quantities of beer and popcorn, respectively. Beth is indifferent between $(2,3)$ and $(3,1)$. She is also indifferent between $(2,3)$ and $(4,2)$, but she would rather have $(4,2)$ than $(3,1)$.
 - e. Motozo likes beer and popcorn, but three beers knock him out for the night, and he gets sick on four bags of popcorn.
2. An anonymous donor is contemplating a substantial gift to Bill Clinton University (BCU). Currently, BCU has tuition and other sources of income that bring it revenue of \$1 million a year. This amount cannot change. BCU spends its money on two activities: fellowships that cost \$20,000 each annually, and hiring interns who "work for" top administrators and also cost \$20,000 a year each.
 - a. Draw the possible combinations of interns and fellowships that BCU can acquire now.
 - b. Suppose the donor's gift will generate income of \$500,000 a year. If the donor's gift is unrestricted, what does BCU's budget set look like?
 - c. If the donor says that all of her money has to be spent on fellowships, what does BCU's budget set look like?
 - d. Compare your answers in parts b and c.
 - e. If the donor says that she will match every dollar that BCU spends on fellowships with a dollar of her own, what does BCU's budget set look like?
3. Yuri consumes two goods: vodka and caviar. Yuri buys 10 bottles of vodka at \$5 apiece when his income is \$100 per month and the price of caviar is \$5 per jar.
 - a. How many jars of caviar does Yuri buy?
 - b. Draw Yuri's budget set and his consumption point.
 - c. A month later Yuri's income rises to \$150 but the price of vodka goes up to \$10/bottle. Yuri loves vodka and now consumes 11 bottles along with 8 jars of caviar. Could this be a rational choice? Explain.

- d. Suppose that in (c), Yuri consumes 8 bottles of vodka and 14 jars of caviar. Could this be a rational choice? Is he better off than he was in a?
4. Using the prices and income in the beginning of problem 3, suppose that the State decides that no one should be able to buy more than 5 bottles of vodka. Draw the new budget constraint. Does Yuri like this new law? Why? Demonstrate your answer using indifference curves and a budget constraint.
5. Given $U(x,y) = xy$, the price of $x=1$ and the price of $y=2$ and income of \$240. Determine how much x and y is consumed at the bundle that maximizes utility subject to the budget constraint.
6. Yuri likes to drink a fruit blend that comprises apples (a), bananas (b) and cantaloupes (c). His utility function from consuming this drink is given by $U = a\sqrt{bc}$. If each fruit is identically priced, then in what proportions must Yuri always blend the fruit?
7. (optional) Shirley has the preferences that can be described by the following utility function: $U(x,y) = \sqrt{xy}$.
- Graph the $U=1$ indifference curve associated with this utility function.
 - Explain briefly the idea of diminishing marginal rates of substitution. Plot U_x against x when $y=1$. Does this utility function exhibit diminishing MRS in x ?
 - Consider the new utility function $U^*(x,y) = 1 + \log(U(x,y))$. Graph the indifference curve associated with this new, transformed utility function. (Hint: use the chain rule.)
8. (optional) If $U = 12(4\log(x) + 12\arctan(y))^{3.981}$ and at current prices and income the optimal bundle is (35,5), if income and prices double, how much x and y will be optimally consumed?
9. (optional) I have \$1 and can use it to buy either oranges (30¢ each) or tofu (50¢ a slab). I want these foods in order to get vitamin C and protein. An orange contains one unit of protein and two units of vitamin C. A slab of tofu contains two units of protein and one unit of vitamin C.
- What is the maximum amount of vitamin C that I can consume? If I do this, how much protein do I get?
 - What is the maximum amount of protein I can consume? If I do this, how much vitamin C do I get?
 - Draw the combinations of protein and vitamin C that are available to me and write the inequality that defines my budget set in protein-vitamin C space.
 - What happens if the price of oranges falls to 10¢ each?