Homework 1

answers

Instructions: Complete all 7 problems. Answers may be handwritten or typed. Students may work together, but must independently write their own answers. Failure to do so will result in a grade of zero.

Problem 1. A consumer chooses a bundle of two kinds of Scotch: Lagavulin 16-year Scotch (L) and Caol Ila 12 year (C). Suppose that $P_L = \$10$ and $P_C = \$7$. Suppose the consumer has \$140 to spend on Scotch.

a. Draw the consumer's budget line. Be sure to label its intercepts.

See figures at end of answer key.

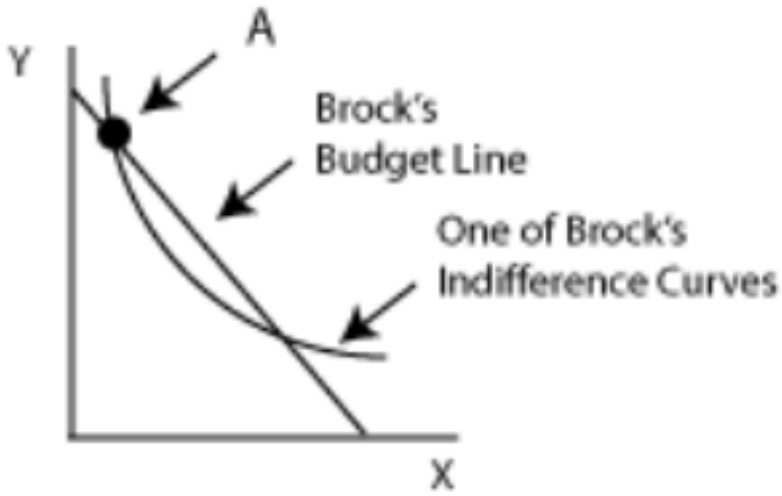
b. Suppose the price of L increases to \$14. Redraw the budget line.

See figures at end of answer key.

c. Now suppose that P_C and P_L both double (to $P_C = \$14$ and $P_L = \$28$), but her Scotch budget also doubles, to \$280. How does her budget line change from part b.?

If both prices and budget double, her budget line will be unchanged.

2. Brock is contemplating consuming Bundle A in the figure below:



Given the information in the figure and that Brocks preferences are well well-behaved, what must be true?

a. Point A is Brocks optimal bundle since the indifference curve intersects the budget line at Point A.

b. At Point A, the MRS equals the slope of the budget line.

c. Brock is not using all of his income at Point A.

d. Brock can find another point that he can afford such that the new point is on a higher indifference curve than the indifference curve given in the figure.

e. Brock should consume more of Good Y since his MRS exceeds the price ratio at Point A.

Problem 3 Arthur spends his income on bread and chocolate. He likes chocolate, but is neutral towards bread, in that he doesn't care if he consumes it or not. Sketch Arthur's indifference curve map over bread and chocolate

See figures at end of answer key.

Problem 4 Molly has utility function $u(C, L) = C * L$ where C equals the number of chicken kebobs she eats each week, while L is the numer of lamba and been schwarma meals she eats each week. Molly has \$100 to spend on Mediterranean food each week. The price of a chicken kebob meal is \$5. The price of a lamb and beef schwarma meal is \$10.

a. List three (C, L) points that give Molly utility of 10. For each, say whether it is on her budget line, below her budget line, or abover her budget line.

There are many such points. For example, $(C, L) = (5, 2), (2, 5), (1, 10)$. The three points I chose cost \$45, \$60, and \$105, so the first two are below her budget line, while the third is above it.

b. List three (C, L) points that are on Molly's budget line. For each, say what her utility is at that point.

Again, there are many such points. For example, $(C, L) = (10, 5), (12, 4), (2, 9)$. Her utility at these three points is 50, 48, and 18, respectively.

c. Pick the highest utility point from part b. At that point, what is Molly's marginal utility per dollar of a chicken kebob meal? What is her marginal utility per dollar of a lamb and beef schwarma meal?

Consider bundle $(C, L) = (10, 5)$. Her marginal utility of chicken kebobs per dollar is $\frac{5}{5} = 1$, while her marginal utility of a lamb and beef schwarma meal is $\frac{10}{10} = 1$.

d. At the point in part c, is Molly maximimizing her utility? If not, say whether or not Molly should consume more C or more L.

Since her marginal utility per dollar is equal across the two goods, yes, she is maximizing her utility. If, in your example, marginal utility per dollar was not equal, she should purchase more of the good with the higher $\frac{MU}{p}$.

e. What is the economic intuition behind the condition $\frac{MU_X}{p_X} = \frac{MU_Y}{p_Y}$?

The rate at which money is transformed into happiness is the same across both goods. Were this not true, a consumer should spend less on the good with the lower $\frac{MU}{p}$ and more on the good with the higher $\frac{MU}{p}$.

Problem 5 Spencer buys five new college textbooks during his first year at school at a cost of \$80 each. Used books cost only \$50 each. When the bookstore announces there will be a 10% increase in the price of new books, and a 5% increase in the price of used books, Spencer's father offers him \$40 extra.

a. What happens to Spencer's budget line? Illustrate the change with new books on the vertical axis, and used books on the horizontal axis.

Spancer was spending \$400 on books before the changes in prices and before the extra money from his father. The intercepts of his budget line were at 5 new books, and 8 used books. After the prices change and he gets an additional \$40, his budget line has intercepts at $\frac{\$440}{\$88} = 5$ new books and $\frac{\$440}{\$55} = 5$ used books. In other words, the extra \$40 he gets from his father is exactly enough to offset the bookstore's price increases.

b. Is Spencer worse or better off after the price change? Explain.

Since Spancer's preferred bundle prior to the price and income changes (5 new books, 0 used books) is still affordable, he must be at least as well off as before. Since there are no additional bundles that are affordable after the price and income changes that were not affordable before (the budget line is exactly the same), there is no reason he would be strictly better off after the changes.

Problem 6 One can of Coke is a perfect substitute for one can of Pepsi for Islay.

a. Which of the following utility functions best represents her preferences? Support your answer (possibly by plotting out indifference curves for each of the three options).

1. $u(P, C) = 3PC$

2. $u(P, C) = P + C$

3. $u(P, C) = \sqrt{P} + \sqrt{C}$

Goods that are perfect substitutes have indifference curves that are straight lines. Of the 3 choices above, only 2 yields straight line indifference curves. Therefore, $u = P + C$ is the appropriate utility function to represent preferences over two goods that are perfect substitutes.

b. Suppose that a can of Coke costs \$.75, while a can of Pepsi costs \$.80 at Islay's preferred vending machine. Obviously, she will purchase only Cokes. Draw a picture of the corresponding indifference curve/budget line graph, and indicate Islay's utility-maximizing bundle on your graph.

See figures at end of answer key.

Problem 7 For Broderick, beer and pizza are perfect complements: he never drinks a beer without a slice of pizza, and vice-versa.

a. Try to write down a utility function representing Broderick's preferences. For example, assign him a utility of 10 if he has 10 slices of pizza and 10 beers. Note that he would also have utility of 10 if he had 10 slices and 15 beers, since he would just throw the excess beer away. (hint: the easiest way to write down a utility function for Broderick is to use the min function).

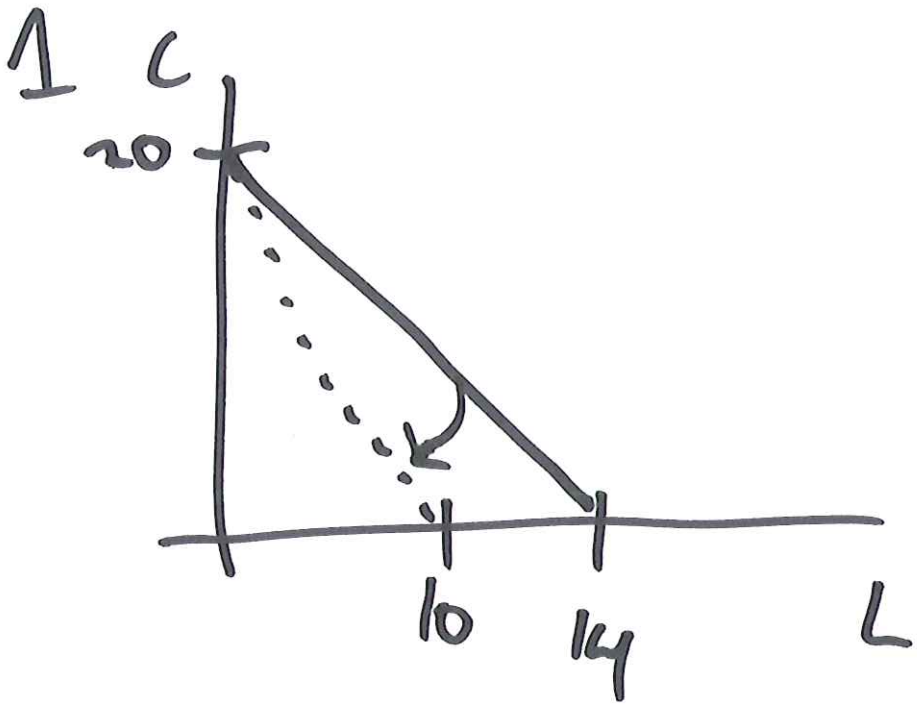
Since all Broderick cares about is the number of beer-pizza pairs he has, if he has X slices and Y beers, his utility is the *smaller* of X and Y. Mathematically, his utility function is $U(B, P) = \min\{B, P\}$. A verbal description of how to construct his utility function is a sufficient answer for this question.

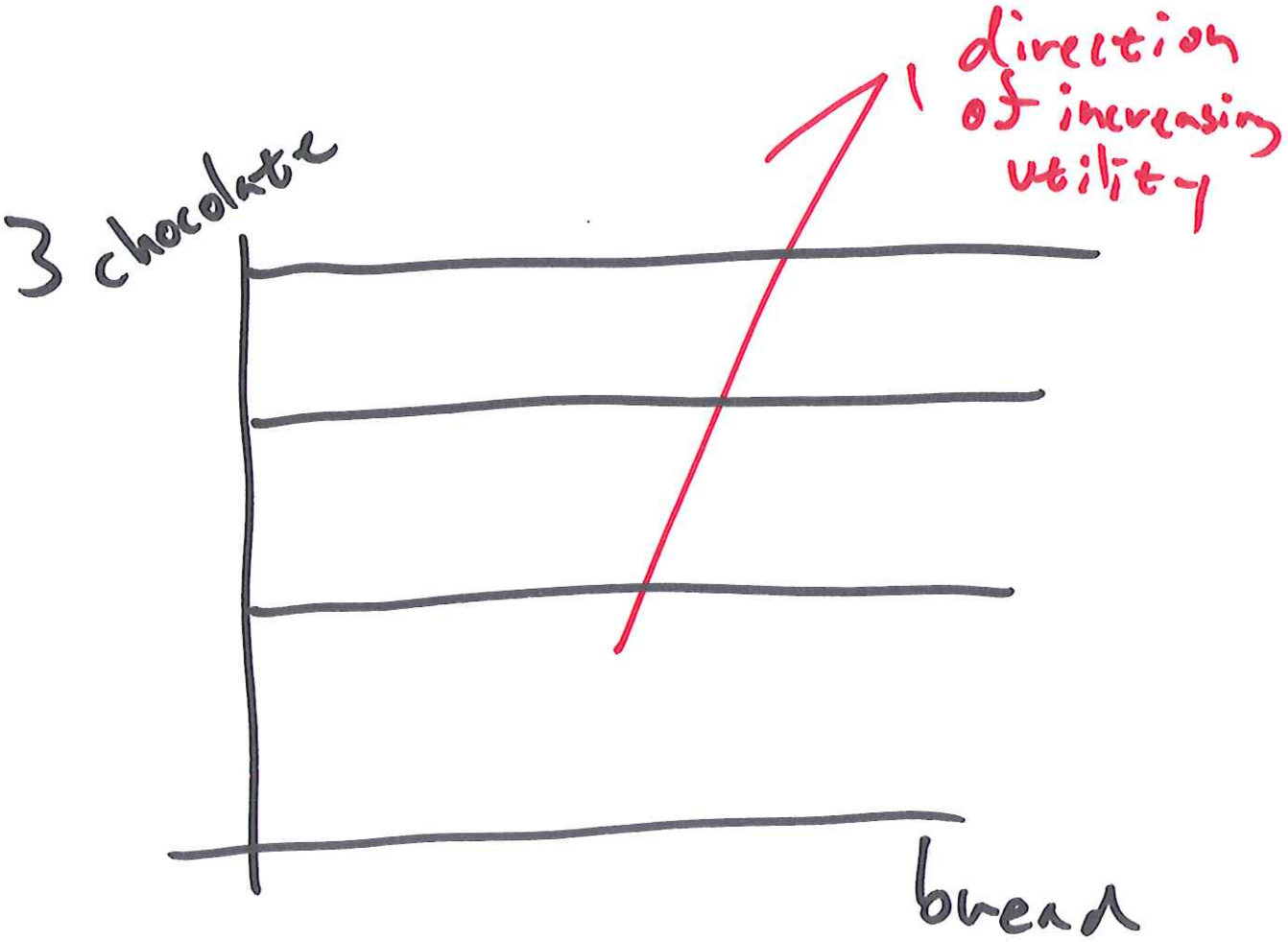
b. Suppose the price of a slice of pizza is \$2, and the price of a beer is \$3. Broderick has \$30 to spend. What is his utility-maximizing bundle?

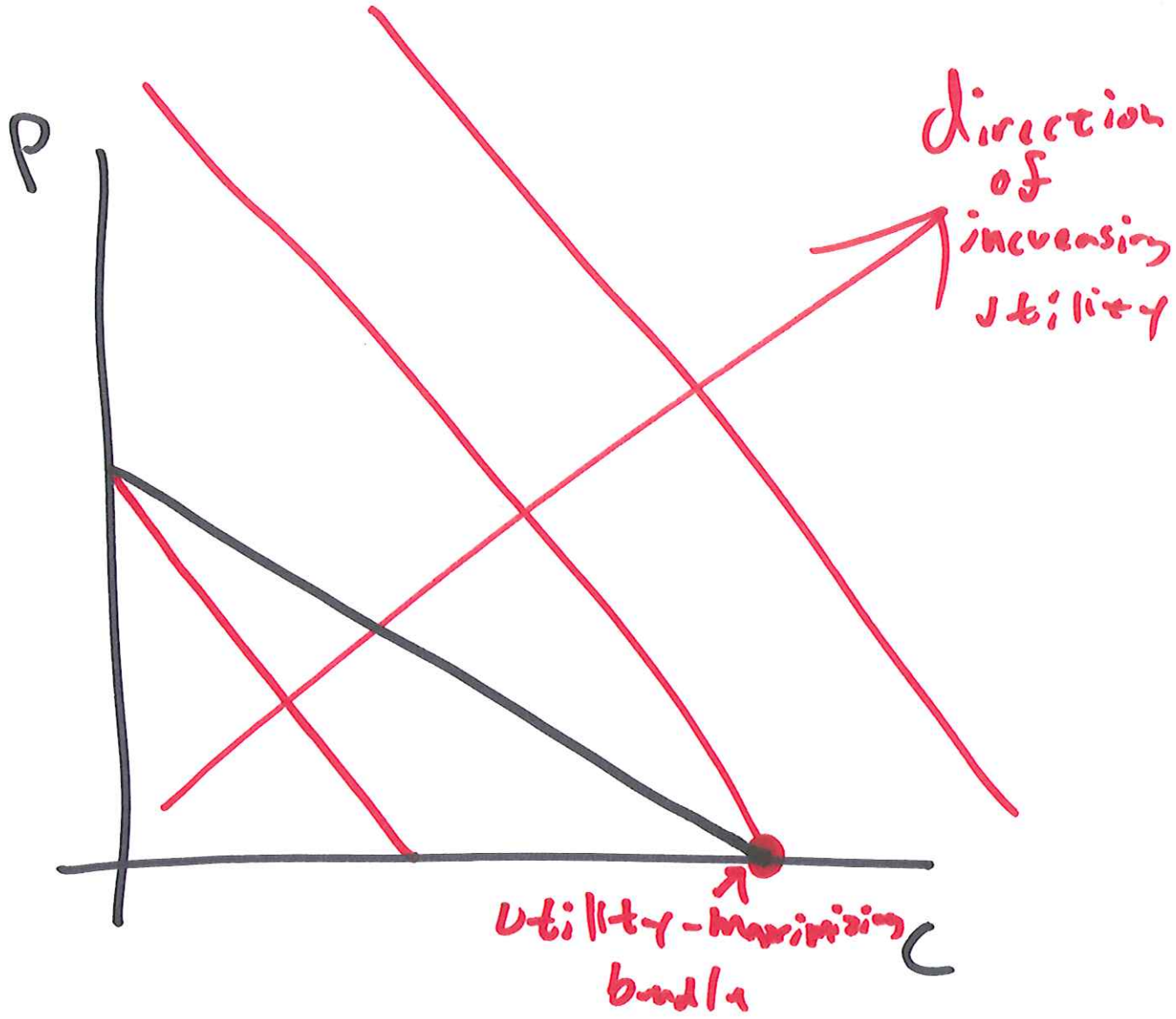
He's only interested in buying as many beer-pizza pairs as possible. Each such pair costs \$5, so with \$30 to spend, he'll buy 6 of each good.

c. Now suppose the price of a slice of pizza changes, to p. Can you write down Broderick's demand function for pizza, as a function of p?

Now, each beer-pizza pair costs $\$3 + p$, and so with \$30 to spend, he'll purchase $\frac{30}{3+p}$ slices of pizza.


1
C
20
10
14
L


direction of increasing utility
3 chocolate
bread


P
direction of increasing utility
utility-maximizing bundle
C

— = budget line