

Problem Set 4
Due before Lecture 5.

On what and how to submit

- For this and all future problem sets, questions are from the “Problems” section of the questions at the end of the chapter.
- Due before Lecture 5 to Blackboard. See assignment turn-in on course home page.
- Submit a pdf file
- Name the file “ps04-[lastname].pdf”. For example, my file would be “ps04_brooks.pdf”.
- In addition, write your name at the top of the problem set.
- You do not need to type your submission. Any **legible** submission is ok. For example, you can write the problem set with hand-drawn graphs, take a picture, and submit the picture as a pdf.

1. GLS Chapter 4, Question 5, but not (b) or (f)

See pictures at end.

(a) Paul finds pencils and pens to be perfect substitutes.

(b) Skip

(c) Because Emily prefers hip hop downloads to heavy metal, she is willing to give up a lot of heavy metal to gain even a little bit of hip hop.

(d) Cufflinks and dress shirts are complements for Michael. For every one dress shirt and two cufflinks, no additional cufflinks (by themselves) or additional dress shirts (by themselves) could make Michael any happier.

(e) I assume that shoes and pizza were complementary for Carlene, but not perfectly so. If you want to go out to eat pizza, you need shoes! Any logically argued answer is acceptable.

2. GLS Chapter 4, Question 15

(a) If Caitlin is maximizing her utility, it must be the case that

$$\begin{aligned} MRS_{C,B} &= \frac{P_C}{P_B} \\ \frac{MU_C}{MU_B} &= \frac{P_C}{P_B} \end{aligned}$$

where C is credit hour and B is books.

The problem says that $P_C = 320$, $P_B = 200$, $MU_C = 80$, and $MU_B = 40$.

We plug these in to the equation from above:

$$\begin{aligned} \frac{MU_C}{MU_B} &= \frac{P_C}{P_B} \\ \frac{80}{40} &\stackrel{?}{=} \frac{320}{200} \\ 2 &\neq 1.6 \end{aligned}$$

Because $MRS \neq \frac{P_C}{P_B}$, Caitlin is not maximizing her utility.

(b) Should Caitlin buy more books and enroll in few credit hours?

If Caitlin buys more books, the marginal utility of books would decrease. To buy more books, Caitlin must enroll in fewer credit hours. When Caitlin enrolls in fewer credit hours, the marginal utility of credit hours increases. Both of these come from our assumption about diminishing marginal utility.

Now think about the key equation:

$$\frac{MU_C}{MU_B} = \frac{P_C}{P_B}$$

When Caitlin changes her behavior, prices do not change, so the righthand side of the equation will stay at 1.6. If MU_C increases and MU_B decreases, the numerator of the MRS increases and the denominator decreases. This means the MRS increases.

But Caitlin's MRS was already too big for her to be maximizing. This change does not get her closer to optimal consumption.

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Alternatively, you could ask whether

$$\frac{MU_C}{P_C} = \frac{MU_B}{P_B}$$

since Caitlin maximizes her utility when these ratios are equal.

From (a), we can write

$$\begin{array}{rcl} \frac{MU_C}{P_C} & = & \frac{MU_B}{P_B} \\ \frac{80}{320} & \stackrel{?}{=} & \frac{40}{200} \\ \frac{1}{4} & \neq & \frac{1}{5} \end{array}$$

If Caitlin increases her book consumption, MU_B would decrease, making the right side even smaller. This does not move Caitlin toward optimal consumption.

3. GLS Chapter 4, Question 16 (Second edition: question 14)

(a) See picture at end. From the facts of this problem, we know that $I = P_l Q_l + P_b Q_b$, or that $100 = 20Q_l + 10Q_b$. If Andre spends all his money on laser tag, he can purchase 5 games; if he spends all his money on books, he can purchase 10 books.

(b) See picture at end. The indifference curve is tangent to the budget constraint where $Q_b = 6$.

(c) When Andre maximizes his utility, we know that he is spending all of his income, and that he's consuming 6 books. Putting these two things together, we can write

$$\begin{array}{rcl} I & = & P_l Q_l + P_b Q_b \\ 100 & = & 20Q_l + 10Q_b \\ 100 & = & 20Q_l + 10(6) \\ 40 & = & 20Q_l \\ Q_l & = & \frac{40}{20} \\ Q_l & = & 2 \end{array}$$

(d) When Andre maximizes his utility, $MU_l = 12$. To find how much utility he gets from reading another book, we rely on what we know about what must hold when Andre is optimizing:

$$\frac{MU_b}{MU_l} = \frac{P_b}{P_l}.$$

We know everything but MU_b in this equation, so we can plug in as follows

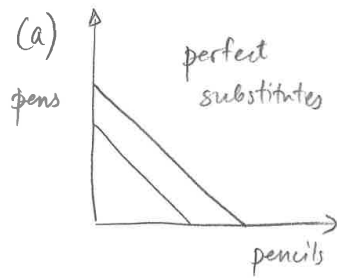
$$\begin{aligned}\frac{MU_b}{12} &= \frac{10}{20} \\ MU_b &= (12)(0.5) \\ MU_b &= 6\end{aligned}$$

Therefore, the marginal utility of books for Andre, when he is consuming optimally, when prices are as given, and when the marginal utility of laser tag is 12, must be 6.

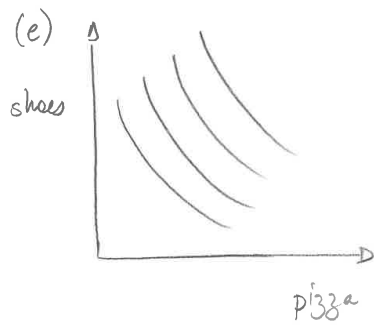
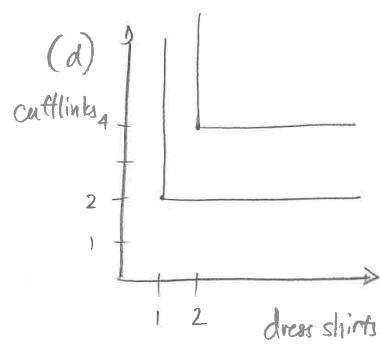
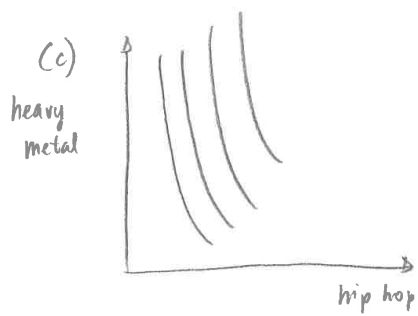
Please make sure you know how to do the in-class problem, as well as question 19.

Pictures for Question 1 (GLS Q5)

GLS, Chapter 4, Q3



(b) n/a



Pictures for Question 3 (GLS Q16)

