Microeconomics for Public Policy
Fall 2023

Problem Set 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 6 to your Box folder
- Name the file "ps05_[lastname].[extension]". For example, my file would be "ps05_brooks.pdf".
- 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.

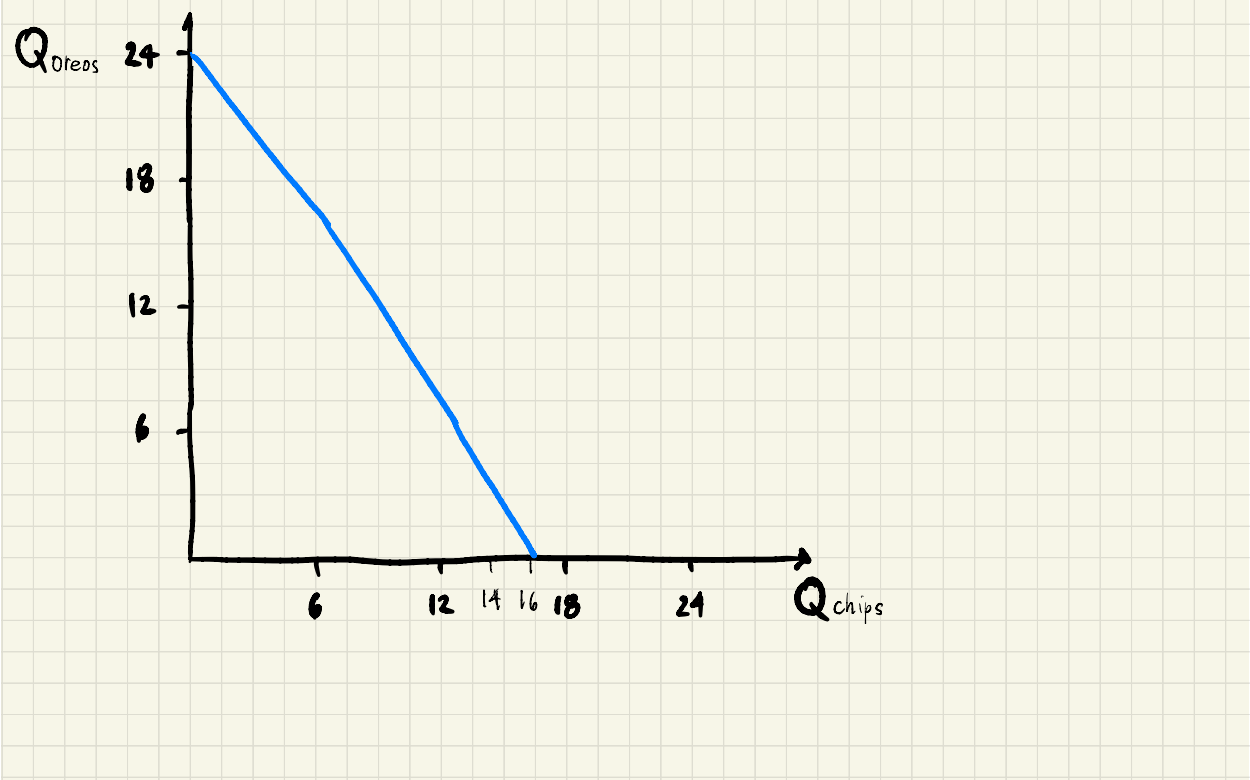
1. GLS Chapter 5, Question 8

(a) Draw budget constraint

Let Q_c be the quantity of chips, P_c be the price of chips, Q_o be the quantity of Oreos, and P_o be the price of Oreos.

See figure below. Note that you can write the budget constraint as

$$\begin{aligned} I &= P_c Q_c + P_o Q_o \\ 48 &= 3Q_c + 2Q_o \end{aligned}$$



(b) $Q_c = 6$: What is Q_o and where is the equilibrium A on the graph?
See figure in (d) for point A. To find Q_o:

$$\begin{aligned} I &= Q_c P_c + Q_o P_o \\ 48 &= 3(6) + 2Q_o \\ 2Q_o &= 48 - 18 \\ 2Q_o &= 30 \\ Q_o &= 15 \end{aligned}$$

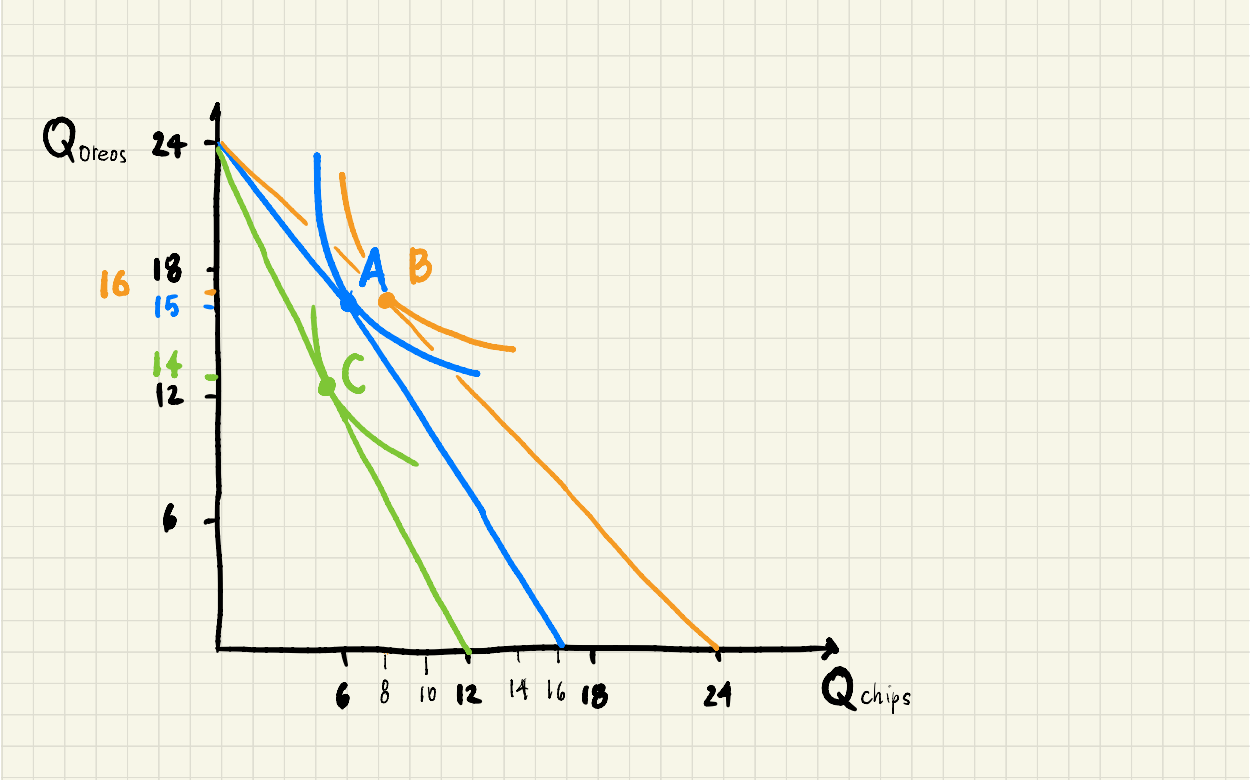
(c) $Q_c = 8$ and $P_c = 2$: What is Q_o and where is the equilibrium B on the graph?
See figure in (d) for point B. To find Q_o:

$$\begin{aligned} I &= Q_c P_c + Q_o P_o \\ 48 &= 2(8) + 2Q_o \\ 2Q_o &= 48 - 16 \\ 2Q_o &= 32 \\ Q_o &= 16 \end{aligned}$$

(d) $Q_c = 5$ and $P_c = 4$: What is Q_o and where is the equilibrium C on the graph?

See figure below for point C. To find Q_o:

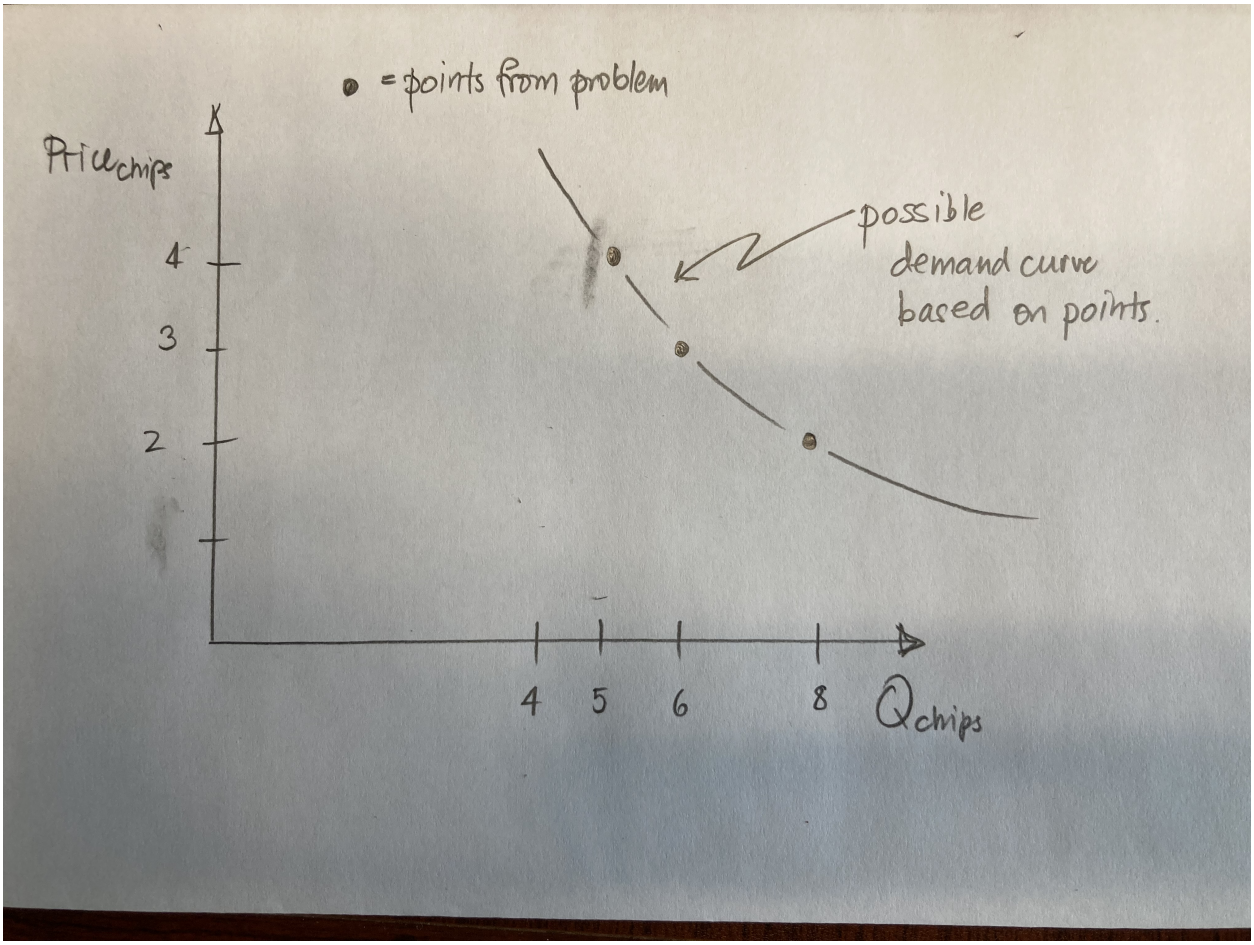
$$\begin{aligned} I &= Q_c P_c + Q_o P_o \\ 48 &= 4(5) + 2Q_o \\ 2Q_o &= 48 - 20 \\ 2Q_o &= 28 \\ Q_o &= 14 \end{aligned}$$



(e) Demand for chips

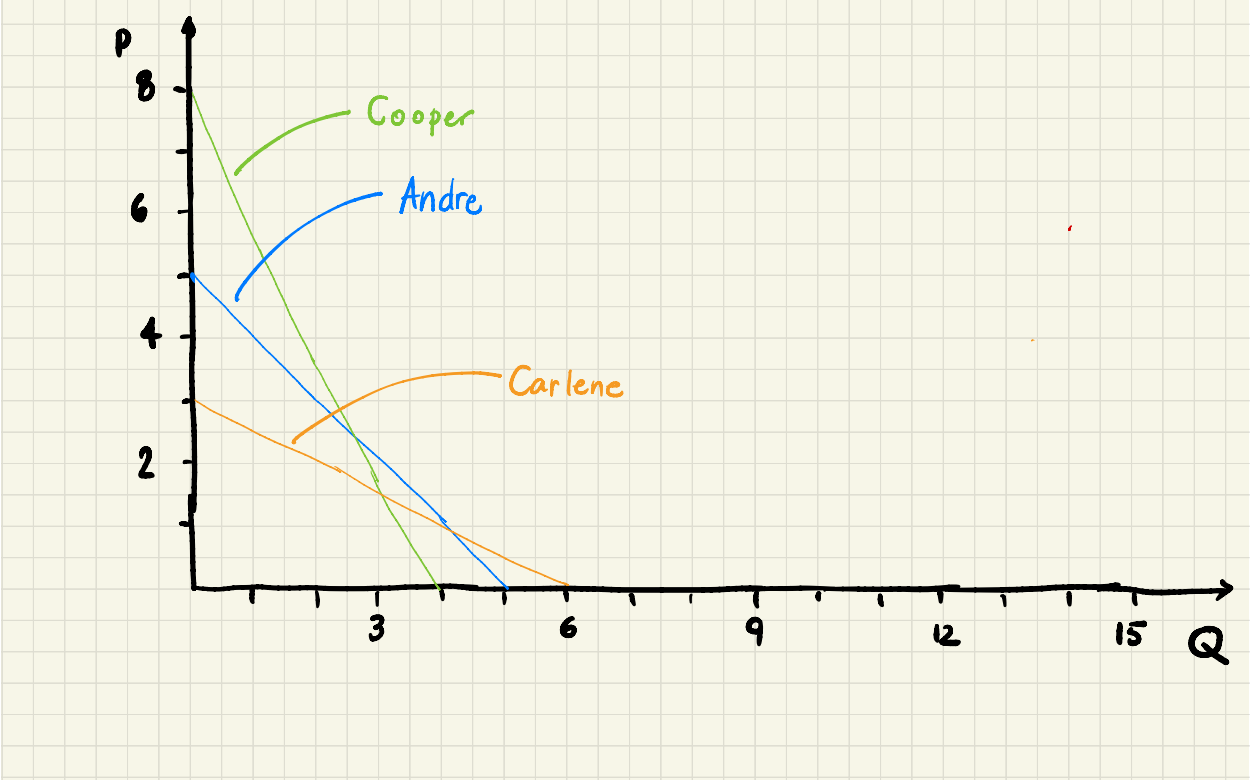
See figure below. To create this figure, note that we know three points along Juliette's demand curve for chips:

Q_c	P_c
5	4
6	3
8	2



2. GLS Chapter 5, Question 22

(a) Market demand curve for doughnuts
Draw the individual demand curves:



Find intercepts for each equation

	When $P = 0$, Q is	When $Q = 0$, P is
A: $Q_A = 5 - P$	5	5
CA: $Q_{CA} = 6 - 2P$	6	3
CO: $Q_{CO} = 4 - \frac{1}{2}P$	4	8

Prices 5 to 8

Note that for prices 5 to 8, the only participant in the market is CO, so the market demand, Q_{M1} is $Q_{M1} = Q_{CO} = 4 - \frac{1}{2}P$.

Prices 3 to 5

For prices 3 to 5, there are two participants in the market: CO and A. To find market demand, add CO's quantity demanded and A's quantity demanded:

$$\begin{aligned} Q_{M2} &= Q_{CO} + Q_A \\ &= 4 - \frac{1}{2}P + 5 - P \\ &= 9 - \frac{3}{2}P \end{aligned}$$

What is the Q intercept for where CO's demand curve gets added to A's? The kink is where $P = 5$, either on the new market demand curve, or CO's demand curve. We'll

solve in CO's curve since it's easier:

$$\begin{aligned} Q_{CO} &= 4 - \frac{1}{2}P \\ &= 4 - \frac{1}{2}5 \\ &= 1.5 \end{aligned}$$

Prices 0 to 3

And then for prices 3 and below, all three people are in the market. The market demand curve is therefore

$$\begin{aligned} Q_{M3} &= Q_{CO} + Q_A + Q_{CA} \\ &= 4 - \frac{1}{2}P + 5 - P + 6 - 2P \\ &= 15 - 3.5P \end{aligned}$$

At what quantity does CA's demand curve get added to the market? At a price of 3, what associated quantity in the market demand?

$$\begin{aligned} Q_{M3} &= 15 - 3.5P \\ &= 15 - 3.5(3) \\ &= 15 - 10.5 \\ &= 4.5 \end{aligned}$$

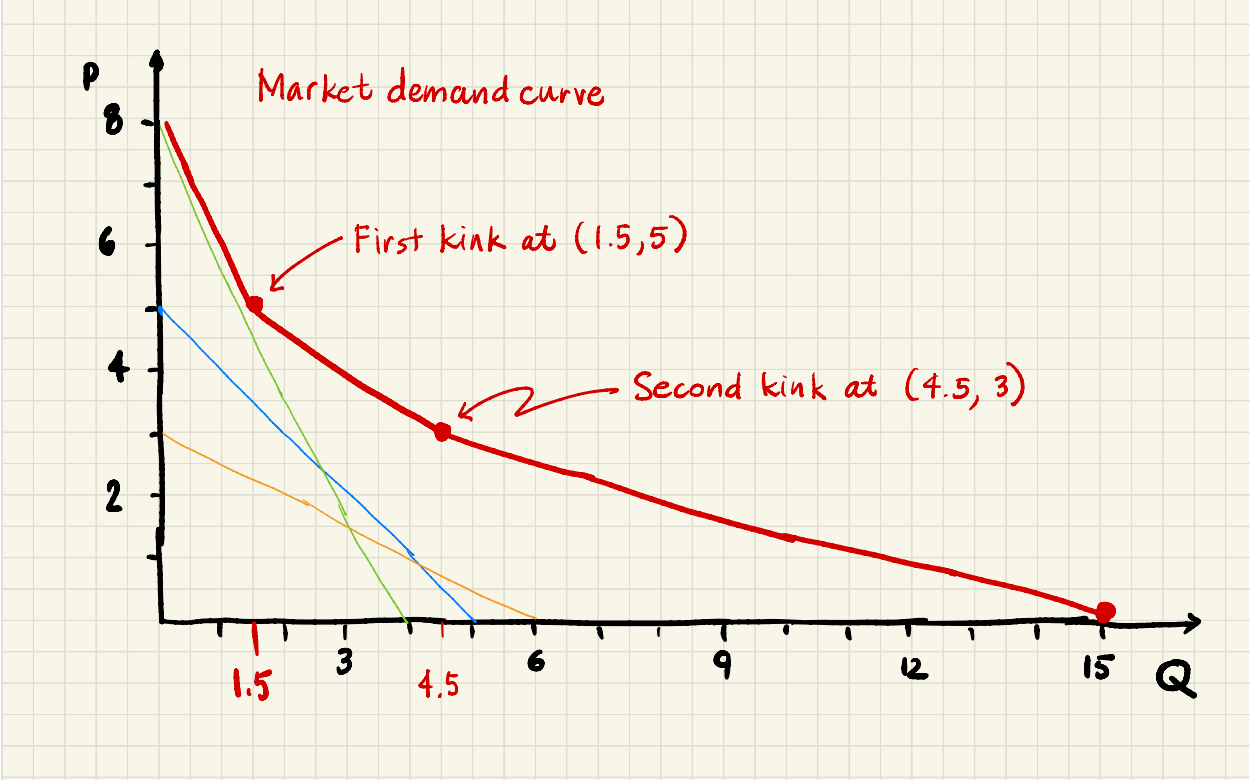
Finally when the price is zero, what is total market demand? We can set $Q_{M3} = 0$, or we can add up the total willingness of pay at a price of zero from our first table: $5 + 6 + 4 = 15$. (You'll find the same answer by setting $P = 0$ in the Q_{M3} equation above.)

Now, how to write this in one equation?

$$Q_M = \begin{cases} 4 - \frac{1}{2}P, & P \geq 5 \\ 9 - \frac{3}{2}P, & 3 \leq P < 5 \\ 15 - 3.5P, & 0 \leq P < 3. \end{cases}$$

(b) Graph market demand

See figure.


P
8
6
4
2
Market demand curve
First kink at (1.5,5)
Second kink at (4.5, 3)
1.5
3
4.5
6
9
12
15
Q