

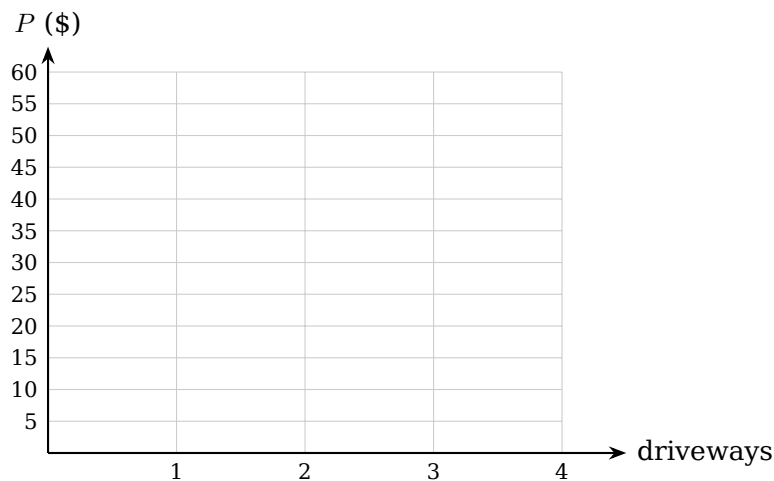
Handout 5: Consumers, Producers, and the Efficiency of Markets

Mankiw Ch 7

Problem 1. Shoveling driveways

After a snowstorm, four households want their driveway shoveled and four students are willing to shovel one driveway each. Each household's willingness to pay and each student's cost (the value of the time and effort) are:

Household	Willingness to pay	Student	Cost
Ortiz	\$50	Sam	\$12
Park	\$40	Tia	\$20
Quinn	\$30	Uma	\$28
Reyes	\$15	Vic	\$35



- Draw the demand curve and the supply curve on the grid.
- In a competitive market, how many driveways are shoveled? What range of prices clears the market? Which household and which student do not trade?

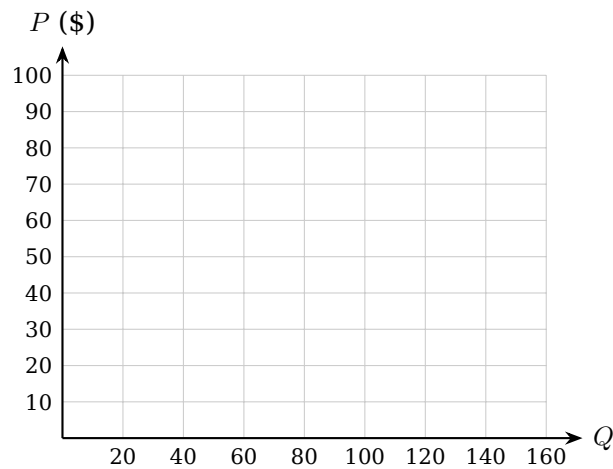
- c) Suppose the price is \$29. Find each household's consumer surplus, each student's producer surplus, and total surplus.
- d) The town caps the price of shoveling at \$25. How many driveways are shoveled now? Is there a shortage? If the jobs go to the households who value them most, what is total surplus, and what is the **deadweight loss**? What if the jobs go to Park and Quinn instead?
- e) The town instead pays to have every driveway shoveled, so all four households get one and all four students work. What is total surplus? Why is it lower than in (c)?

Problem 2. Kayak rentals

The daily market for kayak rentals on the Charles River is described by

$$Q_d = 300 - 3P \quad Q_s = 2P$$

where P is the price of a rental in dollars and Q is rentals per day.



- Find the equilibrium price and quantity.
- Draw both curves on the grid. Shade consumer surplus and producer surplus, and compute each and total surplus.
- What is the 60th rental worth to the person who rents it, and what does it cost the owner to provide? Explain why it should be rented.

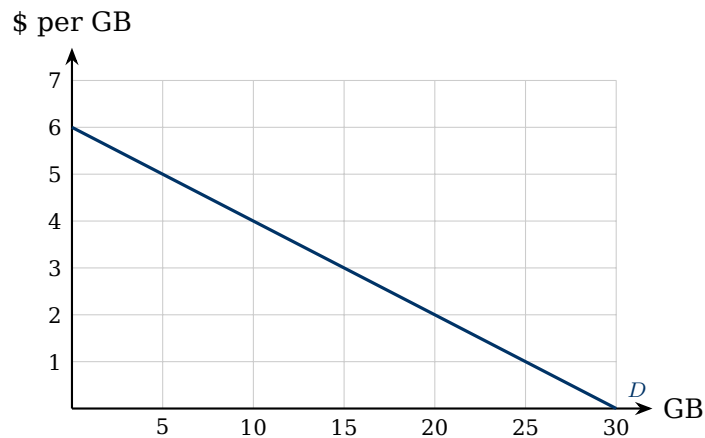
- d) A sunny summer raises demand to $Q_d = 350 - 3P$. Find the new price and quantity. By how much does producer surplus rise? Split the gain between owners who were already renting and new rentals.
- e) Back to the original demand. The kayak owners persuade the city to set a price floor of \$80. How many kayaks are rented? Find CS, PS (assume the rentals go to the owners with the lowest cost), total surplus and the deadweight loss. Who gains and who loses?

Problem 3. Choosing a data plan

Maya's monthly demand for mobile data is

$$Q = 30 - 5P$$

where Q is gigabytes (GB) a month and P is the price she pays for one more GB.



- a) **Plan A:** unlimited data for \$60 a month. What does one more GB cost her? How many GB does she use? What is the data worth to her in total, and what is her consumer surplus?
- b) **Plan B:** \$2 per GB, no monthly fee. How many GB does she use? What is her bill, the total value of her data, and her consumer surplus?
- c) Which plan should she choose? She uses more data on Plan A; why is it still the worse deal?

- d) At what monthly price would Plan A be exactly as good for her as Plan B?
- e) Plan B cuts its price to \$1 per GB. How many GB does she use, and what is her consumer surplus? How much of the gain comes from GBs she already used, and how much from new ones?

Problem 4. Efficient or not?

Answer each in two or three sentences.

- a) The Celtics sell 200 playoff tickets by lottery at \$50 each and ban resale. Is this allocation efficient? What happens to total surplus if resale is allowed?
- b) "A scalper who buys a ticket for \$100 and sells it for \$300 makes society worse off."
True or false?

- c) A cement plant sells in a competitive market, and its kilns pollute the air of the town around it. Is the market quantity of cement efficient?
- d) "The market equilibrium maximizes total surplus, so the market outcome is fair."
True or false?