1. It is a hot a day and Bert is very thirsty. Here is the value he places on a bottle of water:

<table>
<thead>
<tr>
<th>Value of first bottle</th>
<th>$7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of second bottle</td>
<td>5</td>
</tr>
<tr>
<td>Value of third bottle</td>
<td>3</td>
</tr>
<tr>
<td>Value of fourth bottle</td>
<td>1</td>
</tr>
</tbody>
</table>

If the price of a bottle of water $4, how many bottles does Bert buy? How much consumer surplus does Bert get from his purchases?

**At $4 Bert would buy 2 bottles. The consumer surplus from the first bottle is $3 and $1 from the second, for a total of $4.**

2. Ernie owns a water pump. Because pumping large amounts of water uses more resources than pumping small amounts, the cost of producing rises as he pumps more. Below is the cost he incurs to produce each bottle of water:

<table>
<thead>
<tr>
<th>Cost of first bottle</th>
<th>$1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of second bottle</td>
<td>3</td>
</tr>
<tr>
<td>Cost of third bottle</td>
<td>5</td>
</tr>
<tr>
<td>Cost of fourth bottle</td>
<td>7</td>
</tr>
</tbody>
</table>

If the price of a bottle of water is $4, how many bottles does Ernie produce and sell? How much producer surplus does Ernie get from these sales?

**Ernie gets $3 on the first bottle and $1 on the second, for a total of $4 producer surplus.**

3. Consider a market in which Bert and Ernie (from above) are buyer and seller, respectively.

a. Use the information above to find Bert’s quantity demanded at prices of $2, $4, and $6. Similarly, find Ernie’s quantity supplied at prices of $2, $4, and $6. Which of these prices brings the amount supplied and the amount demanded into equilibrium?

<table>
<thead>
<tr>
<th>P</th>
<th>Q_d</th>
<th>Q_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>$4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>$2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Equilibrium price is $4 because Q_d = Q_s = 2 at that price.**
b. What are consumer surplus, producer surplus, and total surplus at this equilibrium?

\[ \text{CS} = \$4 \]
\[ \text{PS} = \$4 \]
\[ \text{Total surplus} = \text{CS} + \text{PS} = \$4 + \$4 = \$8 \]

c. If Ernie produced and Bert consumed one less bottle of water, what would happen to total surplus?

Total surplus would fall by $2.

d. If Ernie produced and Bert consumed one additional bottle of water, what would happen to total surplus?

Total surplus would fall by $2.

Note: A free market would not produce this result. Only if government compelled production or granted a subsidy would this occur.


Decrease supply. Decrease in CS from \((A + B + C)\) to just \(A\).

Lemons are an input in the market for lemonade, so a higher price of lemons represents an increase in cost conditions of producing lemonade. The supply
of lemonade shifts left, and consumer surplus declines from \( D + E + F \) to just area \( D \).

![Lemonade Diagram]


**Increase demand for French bread leads to an increase in producer surplus from area \( A \) to \( A + B + C \).**

![Flour Diagram]

The demand for an input (e.g., flour) is derived from the demand for the
output (e.g., bread) it produces. So there is an increase in demand for flour and an increase in PS in the flour market.

6. Consider how health insurance affects the quantity of health care services performed. Suppose that the typical medical procedure has a cost of $100, yet a person with health insurance pays only $20 out of pocket when he/she chooses to have an additional procedure performed. The insurance company pays the remaining $80. (The insurance company hopes to recoup the $80 through higher premiums for everybody, but the share paid by the individual consumer is small.)

   a. Draw the demand curve in the market for medical care. (The horizontal axis represents the number of medical procedures.) Show the quantity of procedures demanded if each procedure has a price of $100.

   Supply curve is perfectly elastic (horizontal) at $100. Point on the Demand curve associated with a price of $100 is some quantity Q1, which is the Qd. (Graph not available.)

   b. Show the quantity of procedures demanded if consumers pay only $20 per procedure. If the cost of each procedure is truly $100, and if individuals have health insurance as described above, will the number of procedures performed maximize the total surplus? Explain.
At a price of $20, Q2 is the Qd, which is much larger than the Qd at price of $100.
At Q2, the value to consumers is less than the true costs of each procedure ($100). So Q2 is too big to maximize total surplus.

c. Economists often blame the health insurance system for excessive use of medical care. Given your analysis, why might the use of care be viewed as “excessive”?

For all quantities greater than Q1, the value to consumers is less than the cost to society to produce the procedures. Units beyond Q1 represent an inefficient allocation of resources, so the economy’s total surplus is reduced.

d. What are two solutions that would prevent this excessive use?

Economic efficiency requires consumption of medical care at quantity Q1. If that quantity is to be provided, consumers must bear the marginal cost of each procedure. Alternatively, some third party (insurance company or government) could limit consumption to Q1. The third party does not consume the benefits of the procedure though, so third-party choices may not reflect the value to the consumer.

7. Using the metaphor of a pie, explain the difference between maximizing economic efficiency and economic equity.

When we are concerned with efficiency we are asking if the pie is as big as possible. Equity deals with whether the pie is divided fairly or not. Equity is a more difficult issue to tackle than efficiency, since it involves more normative judgments; efficiency can be evaluated on the less personally subjective condition of maximizing gains from trade. (Mankiw, p. 147-148)

8. Assume that the market for pizza is characterized by a downward-sloping demand curve and an upward sloping supply curve.

a. Draw the competitive market equilibrium. Label the price, quantity sold, consumer surplus, and producer surplus. Is there any deadweight loss? Explain.
There is no deadweight loss. The gains from trade and the total surplus are at a maximum.

b. Suppose the government forces each pizzeria to pay a $1 tax on each pizza sold. Illustrate the effect on this tax on the pizza market, being careful to label the new price and quantity sold, the consumer surplus, the producer surplus, the deadweight loss, and government revenue. How does each compare to the pre-tax case?

9. The demand for beer is more elastic than the demand for milk. (Why?) Assuming the same supply elasticity for beer and milk, use a model of each market to answer the following?
(a) Would a tax on beer or milk raise more revenue?

A tax on milk will raise more revenue. Milk has relatively inelastic demand compared to beer (milk has fewer substitutes, especially as a beverage for children). Therefore, consumers have fewer options and cannot easily substitute away from milk. So most milk buyers continue to purchase milk—and pay the tax. See diagram below.

(b) Would a tax on beer or milk have the greater deadweight loss (excess burden)?

A tax on beer will have greater deadweight loss. The quantity of beer bought and sold to falls more than the quantity of milk falls. This reduction in beer bought and sold results in a bigger deadweight loss than would occur with the tax on milk. See diagram below.