1. The supply and demand model

- graphs drawn with price on the vertical axis and quantity on the horizontal axis
- one graph for each good.

a. The demand curve for good A

- shows the amount of good A that buyers are willing to buy at each price.

- usually downward-sloping: As price increases, buyers are willing to buy less of the good.

- Factors that cause the demand curve to shift to the right:

  Anything that causes the amount demanded of the good at each price to increase.

  i. A change in income. If the general income level increases, and the good is a normal good, the total demand for the good at each price will increase. The demand curve will shift to the right. If the general income level decreases and the good is an inferior good, the total demand for the good at each price will increase, and the demand curve will shift to the right.

  ii. An increase the price of a substitute good. When the price of a substitute for good A increases, buyers shift towards buying more of good A at any price. Thus the demand curve for good A shifts to the right.

  iii. A decrease in the price of a complement good. When the price of a complement for good A decreases, the price of the two goods together decreases, so more of good A is demanded. Thus the demand curve for good A shifts to the right.

  iv. A change in expectations about the price of the good. If people learn that the price of the good is due to increase in the future, they will tend to buy more of it now, as good A now is a close substitute for good A in the future.

  v. Tastes and needs. When a good goes into style or becomes necessary due to a change in circumstances, the demand curve for it shifts to the right.
vi. Governmental or other regulations. When a good becomes legal after having been illegal, the demand curve for it would tend to shift to the right.

vii. Number of buyers increases.

The same factors in the opposite direction cause the demand curve to shift to the left.

b. The supply curve for good A.

- shows the amount of good A that sellers are willing to sell at each price.

- Usually upward sloping: sellers are willing to sell more the higher the price is.

Factors that cause the supply curve to shift to the right:

i. Price of an input falls. The lower the price of an input, the less it costs firms to produce a given amount of the good. So they make more profit at each price, so they are willing to sell more of the good at each price, and the supply curve shifts to the right.

ii. Technology improves. This allows firms to make more profit at each amount produced due to lower cost of each amount produced, so they will be willing to sell more at each price.

iii. Expectations change. If it is expected that the price will decrease in the near future, sellers will try to sell more of the good now and the supply curve will shift to the right.

iv. Number of sellers increases.

v. Government or other regulations. If a good that was previously illegal to sell becomes legal, the supply curve for it shifts to the right. If a tax that had been imposed on a good is lifted, the supply curve for the good shifts to the right. If a good becomes subsidized (companies are paid for every unit they sell), the supply curve for that good shifts to the right (it shifts vertically down by the amount of the subsidy).

c. Supply and demand together.

- Consider the supply curve and the demand curve for good A, drawn on
the same axes with price on the vertical axis and quantity on the horizontal axis.

- Suppose the supply curve is upward-sloping and the demand curve is downward-sloping. Then the two curves intersect at exactly one point. Assume that point is in the positive quadrant, i.e. $P > 0$ and $Q > 0$ at that point.

- This point of intersection is called the equilibrium point. This is the point at which quantity demanded equals quantity supplied. Its price is called the equilibrium price and its quantity is called the equilibrium quantity.

- We assume that the economy instantaneously adjusts to the new equilibrium price and quantity after any change. (In reality it takes time)

- How does the economy adjust to the equilibrium price and quantity?
  
  i. If the price is higher than the equilibrium price, the amount demanded is lower than the amount sellers are willing to sell. Sellers will notice that they are not selling as much as they want and will lower the price to be able to sell more.

  ii. If the price is lower than the equilibrium price, the amount demanded is higher than the amount sellers are willing to sell at that price. Sellers will notice this in some way, and will raise the price to a price at which they are willing to sell more.

  d. Demand shifts

- When the demand curve shifts how does it change equilibrium price and quantity?

  i. When the demand curve shifts to the right with no change in the supply curve, equilibrium price and quantity increase.

  ii. When the demand curve shifts to the left with no change in the supply curve, equilibrium price and quantity decrease.

  e. Supply shifts

- When the supply curve shifts how does it change equilibrium price and quantity?
i. When the supply curve shifts to the right with no change in the demand curve, equilibrium price decreases and equilibrium quantity increases.

ii. When the supply curve shifts to the left with no change in the demand curve, equilibrium price increases and equilibrium quantity decreases.

f. Exercises: Examples of the effects of demand shifts.

i. Silicone is an input in computer chips. Suppose the price of silicone increases. What happens to the equilibrium price and quantity of computer chips?

ii. Shoes and shoelaces are complements. Suppose the price of shoes decreases. What happens to the equilibrium price and quantity of shoelaces?

iii. CDs purchased legally and pirated CDs are substitutes. Suppose the fine for pirating CDs increases. What happens to the equilibrium price and quantity of legally purchased CDs?

iv. Suppose an early frost is expected to hit the wine-producing region of France, destroying the grapes for wine. What happens now to the equilibrium price and quantity of wine?

v. Suppose a tax is announced to be levied in a month on the selling of plastic utensils (Such a tax has been implemented in Belgium). What happens now to the equilibrium price and quantity of plastic utensils?

2. The production possibilities model

a. describes different levels of joint production that are possible. For each quantity of good A the production possibilities frontier tells you the maximum amount of good B that can be produced. For each quantity of good A the production possibilities set tells you all the quantities of good B that can be produced.

b. Two goods. The quantity of one good produced is graphed on the horizontal axis and the quantity of the other good produced is graphed on the vertical axis.

c. Points below the production possibilities frontier are inefficient productions. Points on the production possibilities frontier are efficient productions. This means that resources are employed in the most productive way and to their full potential.
d. The benefits of trade

  - When there are two goods and two people, trade can benefit both people if the following two conditions hold:

    i. Their opportunity costs of good 1 for good 2 are different. This implies that one person has a comparative advantage in one good, and the other person has a comparative advantage in the other good.

    ii. Both people like to consume both goods.

e. Exercises

  i. Consider three people, A, B and C. They each work 12 hours a day, doing two tasks, baking bread and solving math problems. A can bake a loaf of bread in 1 hour and solve a math problem in 2 hours. B can bake a loaf of bread in 3 hours and solve a math problem in 1/2 hour. C can bake a loaf of bread in 2 hours and solve a math problem in 2 hours.

  What are A’s, B’s and C’s opportunity costs of baking a loaf of bread in terms of math problems solved? Draw the production possibilities set of each of them alone.

  Draw the production possibilities set of all together. Show that the allocation that has all of them spending 1/2 of their time on each task is inefficient.

  Answer: A needs 1 hour to bake a loaf of bread, in 1 hour A can solve 1/2 math problem. So the opportunity cost for A of a loaf of bread in terms of math problems is 1/2, and the slope of A’s production possibilities frontier with bread on the horizontal axis and math on the vertical axis is -1/2.

  Similarly, the opportunity cost for B of a loaf of bread in terms of math problems is 6 = 3/(1/2). The slope of B’s production possibilities frontier with bread on the horizontal axis and math on the vertical axis is -6. The opportunity cost for C of a loaf of bread is one math problem. So the slope of C’s production possibilities frontier with bread on the horizontal axis and math on the vertical axis is -1.

  Construct the total production possibilities frontier in the following way. Bread is cheapest for A, less cheap for C and most expensive for B (in terms of math problems).

  We know that the points where all of them spend all their time solving math
problems and where all of them spend all their time baking bread are efficient. Start from the point (0, 36) and increase the amount of bread baked.

The most efficient (cheapest) way to do this is to have A change from math to bread. The slope is thus $-1/2$ from (0, 36) to (12, 30). Now A is spending all 12 hours baking bread. To increase bread production most efficiently, now C must shift to baking bread. C gives up 1 math problem for each loaf of bread, so the slope from (12, 30) to (18, 24) is $-1$. Now to increase bread production, B must start baking bread. B gives up 6 math problems for each loaf of bread so the slope from (18, 24) to (22, 0) is $-6$. This is the total production possibilities frontier.

ii. Consider the setup of the trade exercise (exercise 2) in homework 2. Suppose the two people are initially both consuming only paintings. Show that they can reach a point outside their indifference curve through trade.