

1. Try to write down the definition of Pareto Efficiency without looking at your notes. Then check your notes to see if they are the same.

We can define Pareto Improvement first and then use it to define Pareto Efficiency. A Pareto improvement is a move that makes at least one individual better off without hurting the others. In the context of PPF where there is only one producer who produces more than one good, a Pareto improvement is a move of the producer that increases the production of at least one good without decreasing the productions of the other goods.

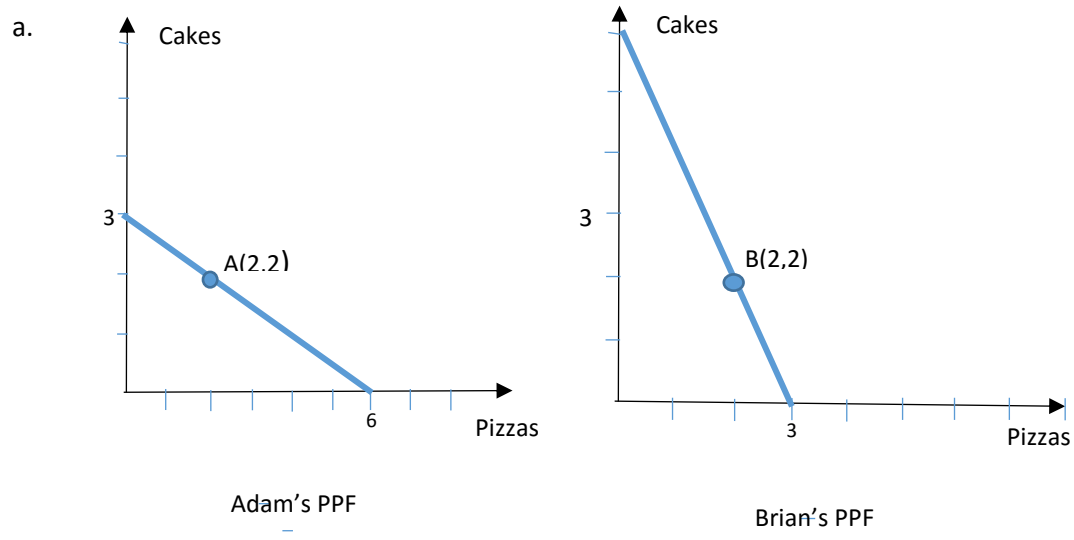
A state is Pareto efficient if there is no Pareto improvement existing.

2. Jack's wage is \$12/hour. What is the price of one hour of leisure for Jack? Why?

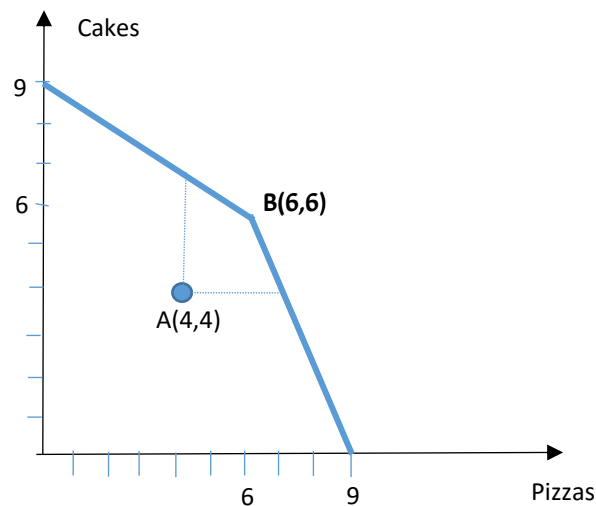
The price of an hour of leisure is the opportunity cost Jack incurs in order to have one hour of leisure. The opportunity cost of one hour of leisure is equal to the wage Jack forgoes for the hour, which is \$12. So the price is \$12.

3. Adam can make 3 cakes or 6 pizzas a day. Brian can make 6 cakes or 3 pizzas a day. Assume currently each of them produces 2 cakes and 2 pizzas a day, and they don't trade.
 - a. Draw Adam's PPF and Brian's PPF (assume they are straight lines.). Show the points of the combination of their current productions.
 - b. Who has the absolute advantage in making cakes, and pizzas?
 - c. Who has the comparative advantage in making cakes, and pizzas? Why (you need to calculate their opportunity costs.)? If the division of labor is introduced, who should specialize in making cakes, and pizzas?
 - d. Show that a trade can make both of them better off. (If you have difficulty answering this, do e) first, then come back and try this again.
 - e. Draw their joint PPF. Show the point of the combination of their current joint productions. Is this point efficient? Why? If your answer is no, you need to show that there exists a Pareto improvement using both Math and graph. (The Pareto improvement here actually consists of a reallocation of productions and a trade.)
 - f. Now suppose Mike makes 5 cakes or 5 pizzas a day. Draw the joint PPF of them three.

Answers:



- b. Adam has absolute advantage in making Pizzas, and Brian has absolute advantage in Cakes, because Adam can make more pizzas a day than Brian, and Brian can make more cakes a day than Adam.
- c. The guys who has the lower opportunity cost of a good has comparative advantage in making that good. Now let's calculate their opportunity costs of making the two goods. In one day Adam can make 3 cakes or 6 pizzas. So 3 cakes and 6 pizzas are equivalent for Adam in the sense that they cost Adam the same amount of resources (one day here). Then 1 cake and 2 pizzas cost Adam the same amount of resources. So for Adam, in order to make 1 cake he has to give up 2 pizzas. So Adam's opportunity cost of cake is 2 pizzas. Similarly $\frac{1}{2}$ cake and 1 pizza cost Adam the same amount of resources. So Adam has to give up $\frac{1}{2}$ cake in order to make 1 pizza. So Adam's opportunity cost of pizza is $\frac{1}{2}$ cake. For Brian 6 cakes and 3 pizzas are equivalent in the sense that they cost Brian the same amount of resources. This implies that 2 cakes are equivalent to 1 pizza, and that 1 cake is equivalent to $\frac{1}{2}$ pizza. So Brian's opportunity cost of pizza is 2 cakes, and opportunity cost of cake is $\frac{1}{2}$ pizza. Since Adam has lower opportunity cost in pizza, he has comparative advantage in making pizzas. Since Brian has lower opportunity cost in cake, he has comparative advantage in making cakes.
- One should specialize in making the good in which he has comparative advantage. That is, Adam should specialize in pizzas and Brian should specialize in cakes.
- d. Without trade currently Adam makes 2 pizzas and 2 cakes a day, and Brian makes 2 pizzas and 2 cakes a day. Now suppose Adam and Brian each specialize in making pizzas and cakes respectively. Adam can make 6 pizzas and Brian can make 6 cakes a day. Adam can sell 3 pizzas to Brian in exchange for 3 cakes. Then after trade Adam now has 3 pizzas and 3 cakes. Brian also has 3 pizzas and 3 cakes. So both Adam and Brian are better off.
- e.

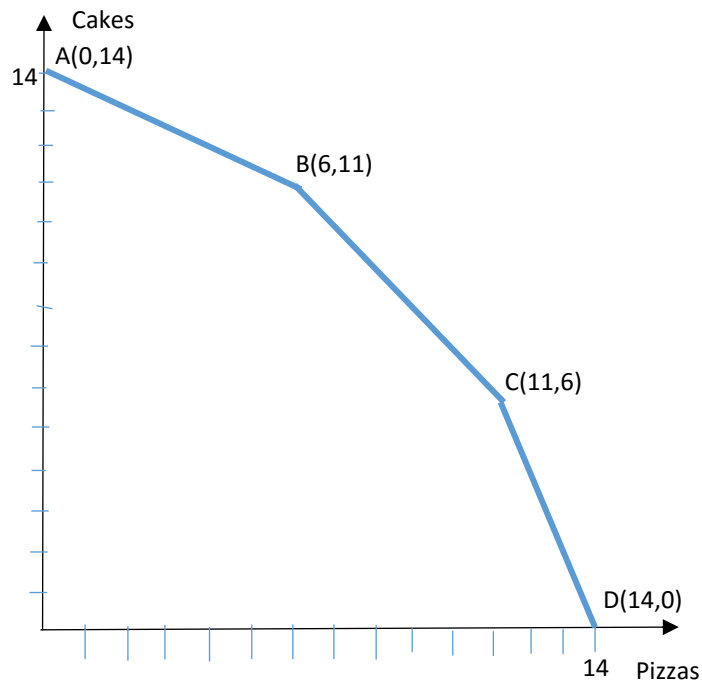


Joint PPF

Currently they are at the point A (Each of them has 2 pizzas and 2 cakes here.). No it is not efficient, because we can find a Pareto improvement. Actually there are infinite number of Pareto improvements here. Any point that is on or below the joint PPF and in the north-east of A is a Pareto improvement of A. One example is the point B(6,6), at which Adam specializes in making pizzas while

Brian makes cakes only. Compared to A, at B the productions of both goods are higher. Another Pareto improvement is the point (5,5), for example. At this point, Adam makes 5 pizzas and Brian makes 5 cakes a day (there is still resources left unused.). Then they can trade and each get 2.5 pizzas and cakes.

f.



Joint PPF of Adam, Brian, and Mike

At point A, all three of them make cakes only. At point D, all of them make pizzas only. At the kink B, Adam makes pizzas only, while the other two make cakes only. At the kink C, Brian makes cakes only, while the other two make pizzas only.