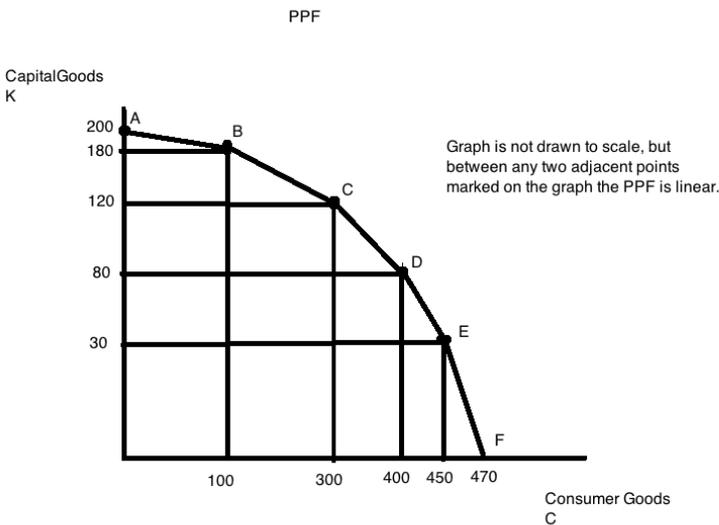


Please write your answers neatly and legibly.

1. Zerbina is a country that produces two types of goods: consumer goods and capital goods. Capital goods are primarily plant and equipment: that is, goods that are manufactured in order to help Zerbina produce more goods in future time periods. Suppose you are given the following production possibility frontier (PPF) for Zerbina where capital goods (K) are measured on the y-axis and consumer goods (C) are measured on the x-axis. Assume that between each designated point on the PPF that the PPF is linear: for example, between points A and B the PPF is linear, between points B and C the PPF is linear, etc. Use this image to answer this set of questions.



a. (1 point) Suppose that Zerbina is currently producing at point D on this PPF. What is the opportunity cost for Zerbina of producing one additional unit of consumer goods? In your answer make sure you provide a numeric value as well as the units of measurement. For full credit show the work you did to find your answer.

**Answer:**

From the graph we can see that the slope of the PPF between points D and E is  $-50/50 = -1$ . That tells us that every time Zerbina increases their production of consumer goods by one unit in this segment of their PPF they must give up 1 unit of capital goods. So, the OC of 1 C is 1 K for Zerbina given that they are initially at point D in the graph.

b. (1 point) Suppose that Zerbina is currently producing at point D on this PPF. What is the opportunity cost for Zerbina of producing 10 additional units of capital goods? In your answer make sure you provide a

numeric value as well as the units of measurement. For full credit show the work you did to find your answer.

Answer:

From the graph we can see that the slope of the PPF between points D and C is  $-40/100 = -2/5$ . That tells us that every Zerbina increases their production of capital goods by one unit in this segment of their PPF they must give up  $5/2$  units of consumer goods. So, the OC of producing 10 additional capital goods must be equal to  $10(5/2 \text{ units of consumer goods}) = 25$  units of consumer goods.

Alternatively, we can write the equation for the PPF between points C and D as  $K = 240 - (2/5)C$  and if K is equal to 90, we can solve to find that  $C = 375$ . Thus, if Zerbina starts at point D where they have 400 units of consumer goods and 80 units of capital goods and then they increase their capital good production to 90 units, they will find that their consumer good production will decrease to 375 units: the opportunity cost of 10 additional units of capital goods is the 25 units of consumer goods that are given up.

c. (1 point) Write an equation in slope-intercept form for Zerbina's PPF for the segment between points B and C. Use K as your symbol for capital goods and C as your symbol for consumer goods. For full credit show the work you did to find your answer.

Answer:

For the segment of the PPF between points B and C we know that the points  $(C, K) = (100, 180)$  and  $(300, 120)$  both sit on this linear segment. We can use these two points to calculate the slope of this segment of the PPF: slope = rise/run = (change in K)/(change in C) =  $-60/200 = -3/10$ . We know that the general form of the slope-intercept equation is:

$$Y = mX + b$$

$$K = (-3/10)C + b$$

To find the value of b, the y-intercept, for this segment of the PPF use one of our given points. Thus,

$$120 = b - (3/10)(300)$$

$$b = 210$$

The equation in slope-intercept form for this segment of the PPF is  $K = 210 - (3/10)C$ .

d. (2 points) For each of the following coordinate points  $(C, K)$  determine whether the points lies on Zerbina's PPF, is infeasible, or is feasible but inefficient.

i.  $(C, K) = (425, 55)$  \_\_\_\_\_

ii.  $(C, K) = (440, 50)$  \_\_\_\_\_

iii.  $(C, K) = (460, 10)$  \_\_\_\_\_

iv.  $(C, K) = (150, 150)$  \_\_\_\_\_

Workspace:

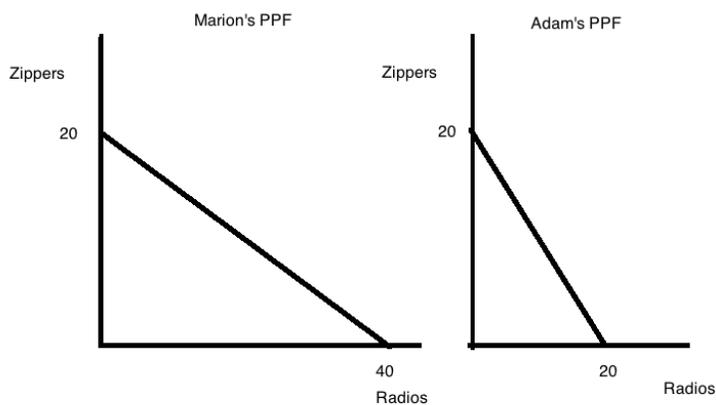
Answer:

- i. Lies on the line: To see this, write the equation for the PPF between points D and E. The equation will be  $K = 480 - C$ . Then, if  $C = 425$  we have  $K = 480 - 425 = 55$ . Alternatively, we know that 425 lies halfway between 400 and 450 units of consumer goods (the end points of the PPF from the consumer good perspective for this segment of the PPF) and therefore we should be at the midpoint of the range of capital goods for this segment of the PPF. The capital good endpoints for this segment are 30 and 80: so midway between this distance of 50 units of capital goods production would be  $30 + 25$  units or 55 units of capital good production.
- ii. Infeasible: lies beyond the PPF: To see this, write the equation for the PPF between points D and E. The equation will be  $K = 480 - C$ . Then, if  $C = 440$  we have  $K = 480 - 440 = 40$ . The point  $(C, K) = (440, 50)$  lies above this point so must be beyond the PPF: this point is not feasible for Zerbina.
- iii. Feasible, but inefficient: To see this, write the equation for the PPF between points E and F. The equation will be  $K = 705 - (3/2)C$ . If  $C = 460$ , we have  $K = 705 - (3/2)(460) = 15$ . The point  $(C, K) = (460, 10)$  lies to the left of the point  $(C, K) = (460, 15)$ . So, the provided point lies inside the PPF: this is a feasible, but inefficient point. Alternatively, you could notice that  $C = 460$  lies halfway between 450 and 470 units of consumer goods (the endpoints from consumer good production for this segment of the PPF) and therefore capital good production must lie halfway between the capital good production endpoints for this segment of the PPF: since these endpoints are 0 and 30, that implies that when consumer good production is equal to 460, that capital good production must be 15 given Zerbina's PPF.
- iv. Feasible, but inefficient: To see this, write the equation for the PPF between points E and F. The equation will be  $K = 705 - (3/2)C$ . If  $C = 460$ , we have  $K = 705 - (3/2)(460) = 15$ . The point  $(C, K) = (460, 10)$  lies to the left of the point  $(C, K) = (460, 15)$ . So, the provided point lies inside the PPF: this is a feasible, but inefficient point. Alternatively, you could notice that  $C = 460$  lies halfway between 450 and 470 units of consumer goods (the endpoints from the consumer good production perspective for this segment of the PPF) and therefore capital good production must lie halfway between the capital good production endpoints for this segment of the PPF: since these endpoints are 0 and 30, that implies that when consumer good production is equal to 460, that capital good production must be 15 given Zerbina's PPF.
- v. Feasible, but inefficient: To see this, write the equation for the PPF between points B and C. The equation will be  $K = 210 - (3/10)C$ . If  $C = 150$ , we have  $K = 210 - (3/10)(150) = 165$ . The point  $(C, K) = (150, 150)$  lies below the point  $(C, K) = (150, 165)$ . So, the provided point lies inside the PPF: this is a feasible, but inefficient point. Alternatively, you could notice that  $K = 150$  lies halfway between 120 and 180 units of capital goods (the endpoints from the capital good production perspective for this segment of the PPF) and therefore consumer good production must lie halfway between the consumer good production endpoints for this segment of the PPF: since these endpoints are 100 and 300, that implies that when capital good production is equal to 150, that consumer good production must be 200 given Zerbina's PPF.

2. Consider Marion and Adam, two individuals who produce zippers (Z) and radios (R). Both Marion and Adam have linear PPFs for these two goods. Marion knows that she is able to produce  $(R, Z) = (10, 15)$  and  $(30, 5)$  given his PPF. Adam knows that he can produce  $(R, Z) = (20, 0)$  and  $(5, 15)$  given his PPF. Use this information to answer this set of questions.

a. (2 points) In the space below draw two graphs. In the first graph depict Marion's PPF measuring Zippers (Z) on the vertical axis and Radios (R) on the horizontal axis: label this graph "Marion's PPF". Make sure you fully label this graph and the numeric values for the x and y intercepts. In the second graph depict Adam's PPF using the same labeling conventions.

Answer:



b. (1 point) Given the above information:

- i. Who has the comparative advantage in the production of radios? \_\_\_\_\_
- ii. Who has the absolute advantage in the production of radios? \_\_\_\_\_
- iii. What is Marion's opportunity cost of producing one zipper? \_\_\_\_\_
- iv. What is Adam's opportunity cost of producing one zipper? \_\_\_\_\_

Workspace:

Answer:

Marion's opportunity cost of producing 1 radio is  $(1/2)$  zipper. Adam's opportunity cost of producing 1 radio is 1 zipper. Thus, Marion has the comparative advantage in the production of radios. Marion also has the absolute advantage in the production of radios since she can produce a maximum of 40 radios while Adam can only produce a maximum of 20 radios.

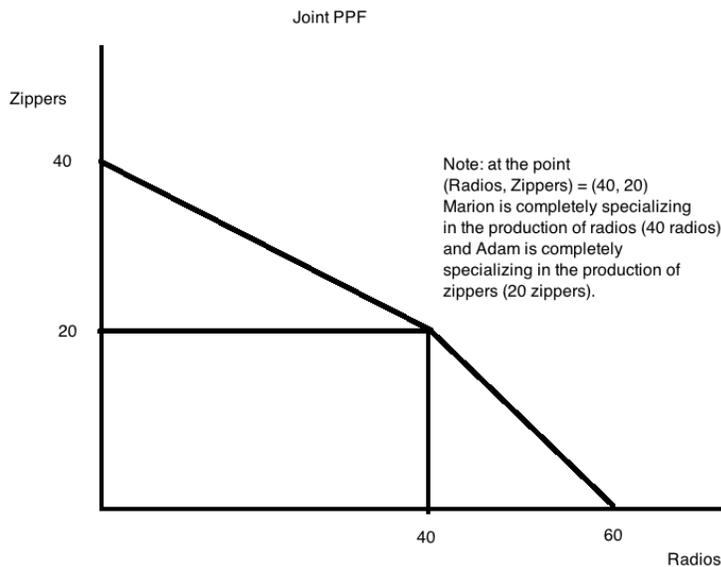
Marion's opportunity cost of producing 1 zipper is 2 radios. Adam's opportunity cost of producing 1 zipper is 1 radio. Thus, Adam has the comparative advantage in the production of zippers. Neither individual has an absolute advantage in the production of zippers.

To recap the answers:

- i. Who has the comparative advantage in the production of radios? Marion
- ii. Who has the absolute advantage in the production of radios? Marion
- iii. What is Marion's opportunity cost of producing one zipper? 2 radios (must include the unit of measurement for this answer!)
- iv. What is Adam's opportunity cost of producing one zipper? 1 radio (must include the unit of measurement for this answer!)

c. (1 point) In the space below draw the joint PPF for Marion and Adam given the above information. Measure zippers on the vertical axis and radios on the horizontal axis. Identify all numeric values for intercepts as well as numeric values for any "kink points" that are in your graph.

Answer:



d. (2 points) In the space below provide a number line as discussed in class that provides the range of acceptable trading prices for 10 zippers. These trading prices should be measured in terms of radios. In your depiction of the acceptable range of trading prices include arrows indicating Marion's perspective and Adam's perspective.

Answer:

10 Zippers

