

Please complete these problems to the best of your ability and submit your solutions on Moodle by 11:59pm on Friday, September 10. When drawing any graphs, please use the appropriate labels on axes and specialization points.

1. Suppose that Alice, Bob, and Cassie are each able to produce red and white wine. Their production possibilities for a single day are as follows:
  - Alice is able to produce 2 bottles of red wine, or 7 bottles of white wine, or any combination of 2 bottles of red and 7 bottles of white at a constant trade-off.
  - Bob is able to produce 5 bottles of red wine, or 8 bottles of white wine, or any combination of 5 bottles of red and 8 bottles of white at a constant trade-off.
  - Cassie is able to produce 10 bottles of red wine, or 7 bottles of white wine, or any combination of 10 bottles of red and 7 bottles of white at a constant trade-off.
- (a) Sketch the production possibilities frontier for each of Alice, Bob, and Cassie individually.
- (b) What is the opportunity cost of a bottle of red wine for each person?
- (c) Who has the comparative advantage in producing red wine? Who has the comparative advantage in producing white wine?
- (d) Who has the absolute advantage in producing red wine? Who has the absolute advantage in producing white wine?
- (e) Sketch the joint production possibilities frontier (PPF) for these three individuals.
- (f) Is the combination of 12 bottles of red wine and 10 bottles of white wine feasible? Is it efficient? What about the combination of 6 bottles of red wine and 20 bottles of white wine?
- (g) Consider now the price of a bottle of red wine in terms of bottles of white wine. What prices would Alice and Bob be willing to trade at? Who, among Alice and Bob, would specialize in white wine at this price?
- (h) Consider once again the price of a bottle of red wine in terms of bottles of white wine. Suppose that a price of 2 bottles of white wine for a bottle of red wine is agreed upon. At this price, who would specialize in red wine? Who would specialize in white wine?
- (i) Suppose that Cassie approaches one other person, either Alice or Bob, to negotiate terms of trade. Suppose that Cassie has a powerful bargaining position, and is able to persuade her potential trade partner to agree to any price that does not exceed their opportunity cost. If Cassie wants to negotiate the best price for herself, who should she approach?

1. (a) Each PPF is labeled here:



Figure 1: Alice's PPF

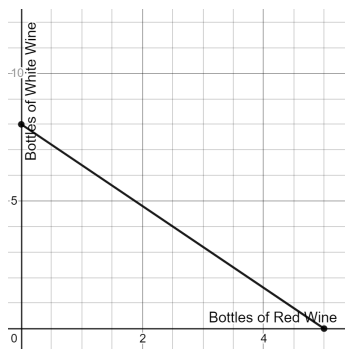


Figure 2: Bob's PPF

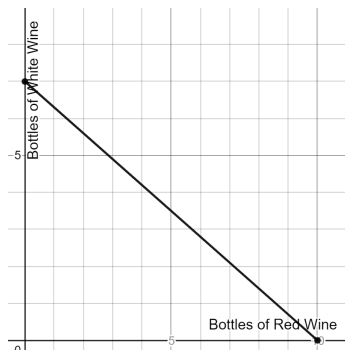


Figure 3: Cassie's PPF

- (b) Alice's opportunity cost for a bottle of red wine is  $\frac{7}{2}$  bottles of white wine. Bob's opportunity cost for a bottle of red wine is  $\frac{8}{5}$  bottles of white wine. Cassie's opportunity cost for a bottle of red wine is  $\frac{7}{10}$  bottles of white wine.
- (c) Cassie has the comparative advantage in red wine since she has the lowest opportunity cost for a bottle of red wine. Similarly, Alice has the comparative advantage in white wine.
- (d) Cassie has the absolute advantage in red wine, since she can produce the largest absolute amount of red wine. Similarly, Bob has the absolute advantage in the production of white wine.

(e) The Joint PPF is given below:

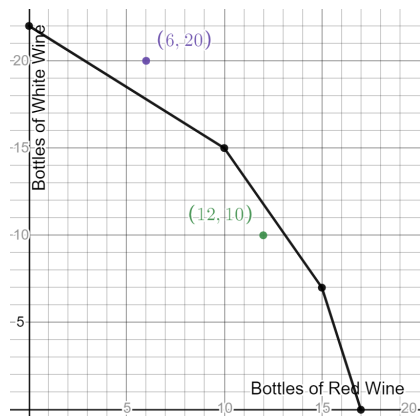


Figure 4: Joint PPF

- (f) As seen in the joint PPF above, the point (12, 10) is feasible but not efficient (it does not lie on the PPF), and the point (6, 20) is not feasible.
- (g) Consider the opportunity cost of red wine for each of these individuals. We see that, among these two individuals, Bob has the comparative advantage in red wine, and Alice has the comparative advantage in white wine. Let us consider the price of a bottle of red wine that both of these agents could potentially agree to, provided they specialize in their respective comparative advantages. Bob is willing to trade a bottle of red wine for at least  $\frac{8}{5}$  bottles of white wine, so Bob is willing to accept a price of  $\left[\frac{8}{5}, \infty\right)$  bottles of white wine per bottle of red wine. Similarly, Alice is willing to give *at most*  $\frac{7}{2}$  bottles of white wine for a bottle of red wine, so Alice is willing to accept any price between  $\left[0, \frac{7}{2}\right]$  bottles of white wine per bottle of red wine. Hence Alice and Bob would be willing to trade at any price in the interval  $\left[\frac{8}{5}, \frac{7}{2}\right]$  bottles of white wine per bottle of red wine.
- (h) At this price, we see that Alice would specialize in white wine, while Bob and Cassie would specialize in red wine. To see why, it's helpful to consider what this trade price allows these individuals to achieve if they were able to trade as much as they wanted by considering their individual PPF's.
- (i) Given that Cassie has the comparative advantage in red wine, she should seek a trade partner that is willing to provide the greatest number of bottles of white wine per bottle of red wine. We then see that Cassie should choose to approach Alice, as Alice is willing to trade up to  $\frac{7}{2}$  bottles of white wine per bottle of red wine, while Bob is willing to trade up to  $\frac{8}{5}$  bottles of white wine per bottle of red wine.