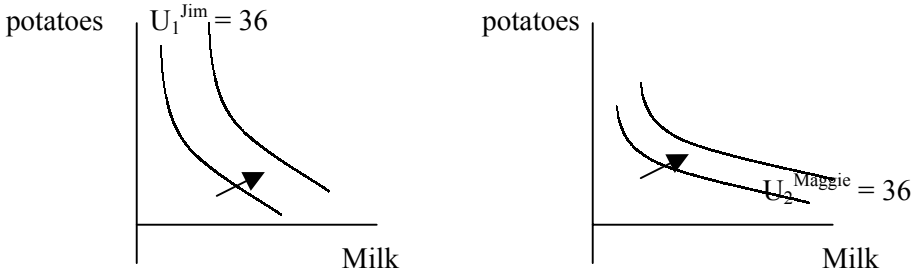
Answers to Inclass Chapter 3 – Understanding Edgeworth Box and Pareto Efficiency

1. Suppose an economy consists of two people, Jim and Maggie. Only two goods exist in the economy, milk and potatoes. Jim's utility function over the two goods is $U^{Jim} = M^2 P$, where *"M"* is the number of gallons of milk Jim has and *"P"* is the pounds of potatoes. Maggie's utility is given by the function $U^{Maggie} = MP^2$.

   a. Would milk and potatoes be classified as "goods", "bads", substitutes, or "neutral" for Jim? For Maggie?

   Goods for both – utility curves have typical shape

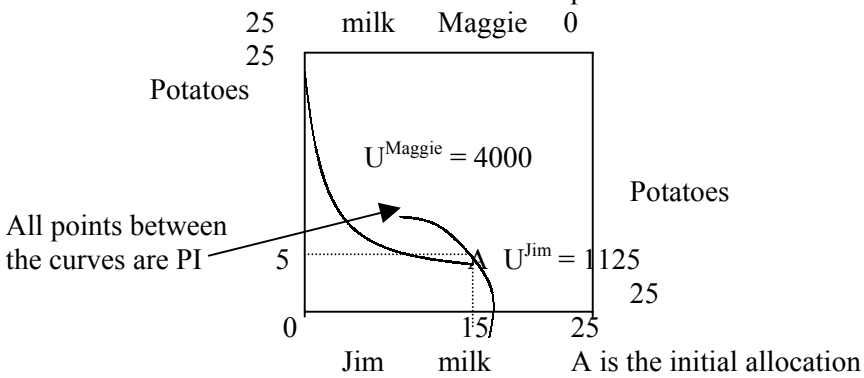
   b. Use **two different** indifference curve diagrams to illustrate Jim and Maggie's preferences over milk and potatoes. Put potatoes on the y-axis and milk on the x-axis. For each person, indicate two different consumption bundles that lie on an indifference curve representing *U=36*. Also, be sure to indicate the direction of increasing utility for both individuals.



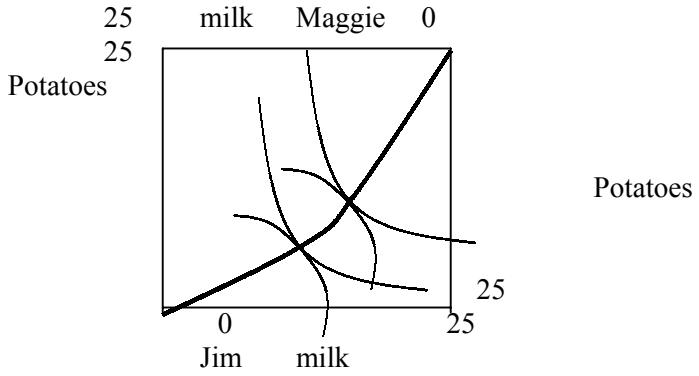
Jim's Utility
M = 1, P = 36
M = 3, P = 4
M = 6, P = 1

Maggie's Utility
M = 1, P = 6
M = 4, P = 3
M = 36, P = 1

   c. Now illustrate their preferences using an Edgeworth Box diagram. Make the origin for Jim be the lower left corner of the box (again, with potatoes on the y-axis and milk on the x-axis). Assume the total endowment of the two goods is 25 pounds of potatoes and 25 gallons of milk, and suppose Maggie is initially endowed with 20 pounds of potatoes and 10 gallons of milk and Jim is endowed with 5 pounds of potatoes and 15 gallons of milk. Indicate both the initial endowment and the area in which Pareto Improvements exist.

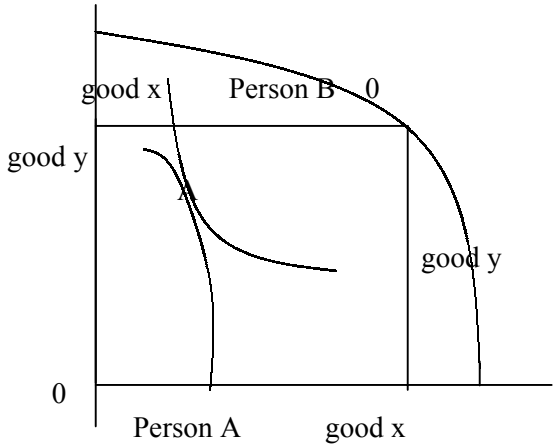
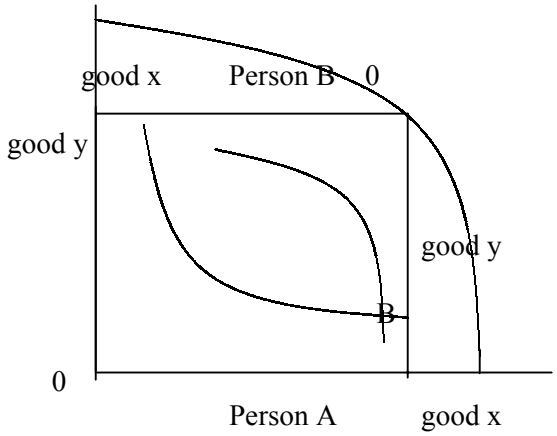


   d. Illustrate (in general) the contract curve in the Edgeworth Box.



2. Explain why the following graphs may not be efficient – and suggest one way

   a. Point A is not efficient (note: assume the IC are tangent at point A) – why? Because the slope of the PPF (which is the MRT_{xy}) is not the same as the slope of person A's IC → MRT_{xy} is not equal to $MRS_{xy}^{A} = MRS_{xy}^{B}$



   b. Point B is not efficient – why? Pareto improvements exist at any point between IC – need $MRS_{xy}^{A} = MRS_{xy}^{B}$, here the $MRS_{xy}^{B} = MRT_{xy}$