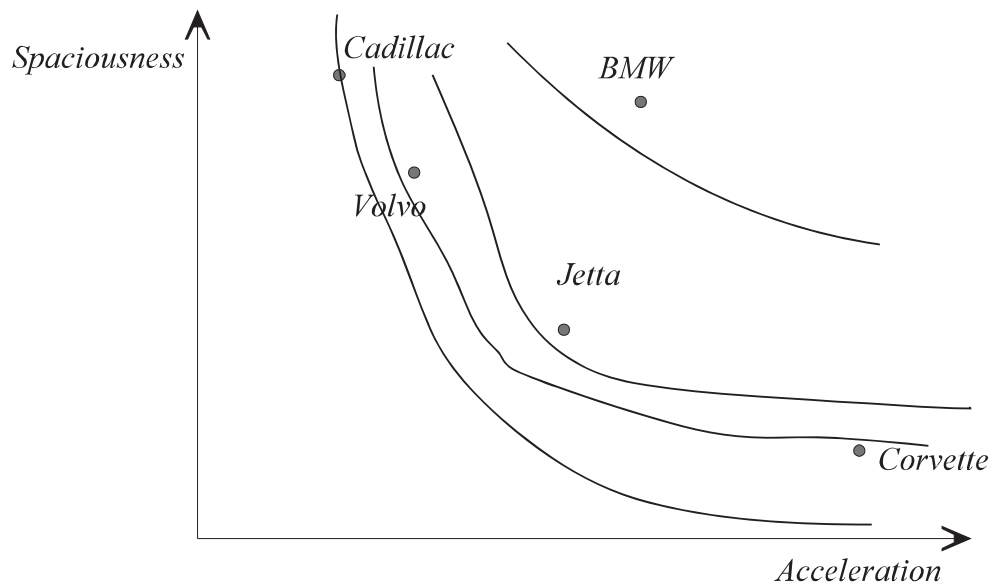**Short Questions**

1. Consider the following 5 cars plotted in the following graph. Suppose that these cars are fully described by their spaciousness and acceleration, i.e., there are no other characteristics that affect a consumer's utility for them.
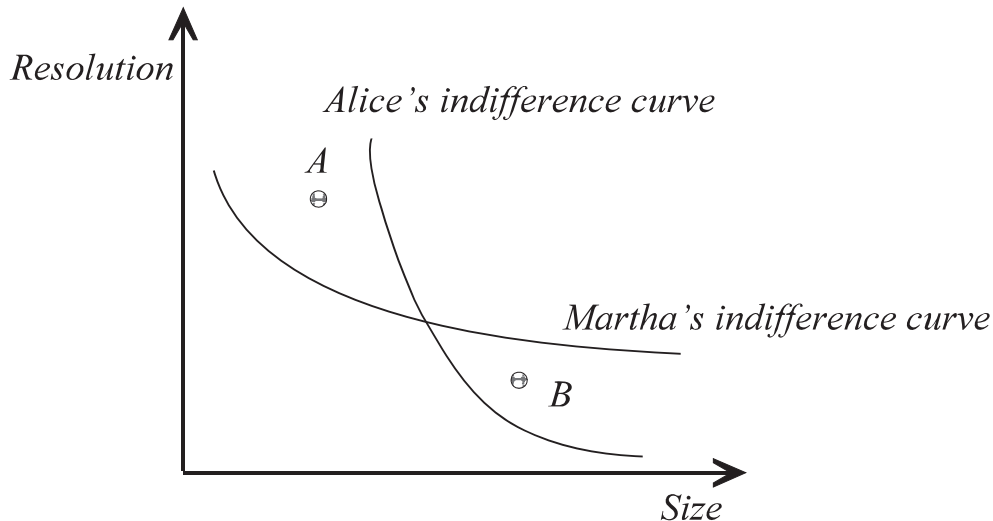

A particular consumer, who values Spaciousness and Acceleration, ranks these cars from most desirable to least desirable in the following way:

1. BMW

2. Jetta

3. Volvo

4. Corvette

5. Cadillac

In the above figure, draw a set of indifference curves that would be sufficient to describe the above ranking, and are also consistent with the fact that utility is increasing in both Spaciousness and Acceleration.

2. The two points in the figure below indicate the resolution-size combinations of two monitors. Both resolution and size a desirable properties: all things equal, consumers prefer monitors of bigger size and better resolution to monitors that are smaller and of poorer resolution.

Note: The "quantities" here are the level of Resolution and Size of the monitors, i.e., the goods are interpreted as being the attributes of the monitors.

a. Martha prefers monitor A to monitor B. In the figure above, draw an indifference curve that indicates this fact.

    See graph.

b. Alice prefers monitor B to monitor A. In the figure above, draw an indifference curve that indicates this fact.

    See graph.

c. Do the two indifference curves intersect?

    Yes, they do intersect.

d. Does this violate the requirement that indifference curves do not cross? Why or Why not?

    No it does not, because each of these indifference curves describes the preferences of a different person.

3. Consider two students: Sarah and Jonathan. The utility function of Sarah for two goods X and Y is given by

$$U_S(X,Y) = \log(X) + 2 \log(Y)$$

while the utility function of Jonathan for the same goods is

$$U_J(X,Y) = 5 \log(X) + 10 \log(Y)$$

Suppose that we give one unit of X and one unit of Y to both Sarah and Jonathan.

Do the utility functions above imply that Jonathan will be 5 times as happy as Sarah?

Do they imply that Jonathan will be happier than Sarah, but we don't know by how much?

What can we say, if anything, about how happy Jonathan will be relative to Sarah?

In the space below answer (and briefly discuss) the above questions.

A utility function can be scaled by an monotonically increasing transformation, and would still reflect the same preferences as the original utility function. Therefore, since the utility function of Jonathan is five times the utility function of Sarah, Sarah and Jonathan have exactly the same preferences. However, even though the utility functions are the same, we cannot say that Jonathan and Sarah will be equally happy from the consumption of one unit of X and one unit of Y. Utility functions do not permit interpersonal comparisons of satisfaction.

4. Consider a person with utility function

$$U = 2X^{\alpha}Y^{\beta}$$

and another person with utility function

$$V = 4X^{\alpha}Y^{\beta}$$

Discuss the following statement:

> "Relative to the first person, the second person is twice as happy to receive any particular combination of X and Y"
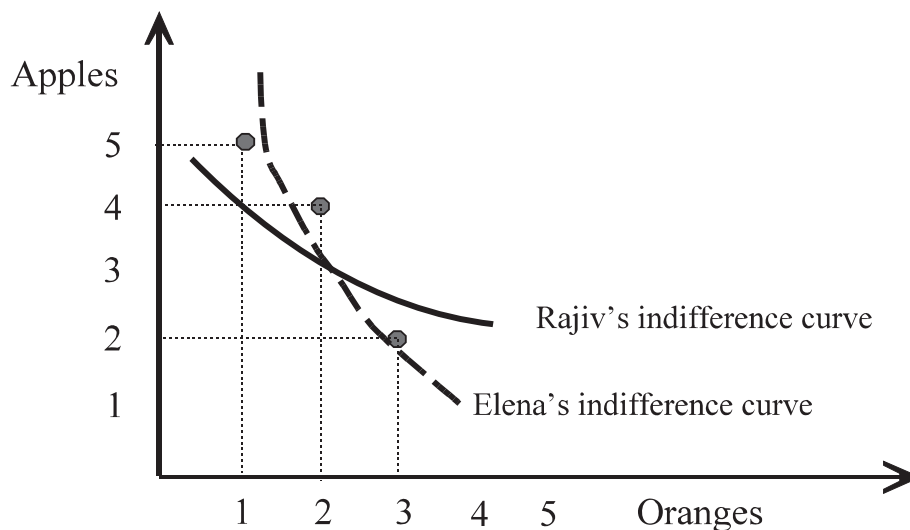
A utility function can be scaled by an monotonically increasing transformation, and would still reflect the same preferences as the original utility function. Therefore, since the utility function of the first person is two times the utility function of second person, these two individuals have exactly the same preferences. Therefore, the above statement is definitely not true.

It should be noted, however, that the statement "These two individuals are equally happy to receive any particular combination of X and Y" is not true either. Utility functions do not permit interpersonal comparisons of satisfaction, so having the same utility function does not mean they are equally happy.

5. Apples and oranges are desirable products for both Rajiv and Elena. Moreover, Rajiv's and Elena's preferences for apples and oranges are characterized by diminishing MRS.

Rajiv prefers 4 apples and 2 oranges to 2 apples and 3 oranges. In the figure below draw an indifference curve that reflects this fact. Elena prefers 2 apples and 3 oranges to 5 apples and 1 orange. Draw an indifference curve that reflects this fact.

Label your indifference curves with the name of the person they correspond to.
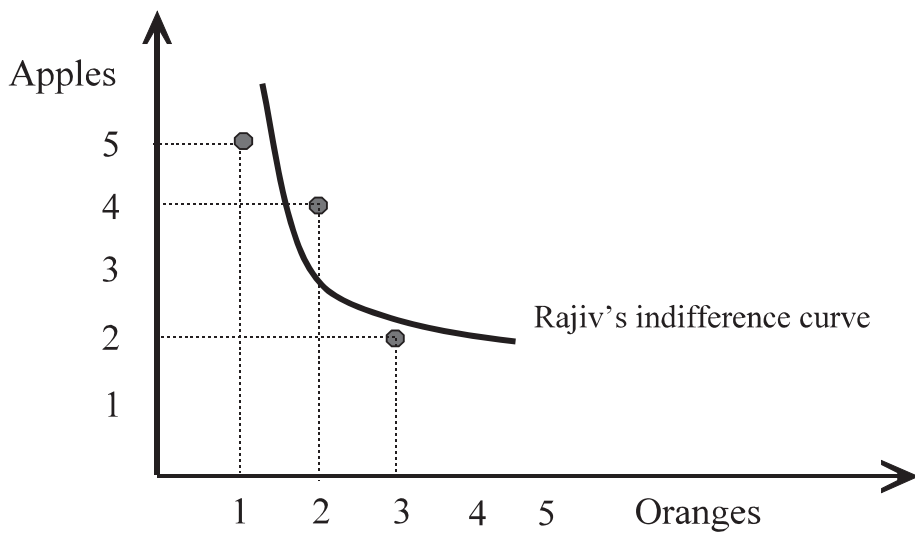

A. According to the indifference curves, <u>as you have drawn them above</u>, does Rajiv prefer 5 apples and 1 orange to 4 apples and 2 oranges?

Rajiv's indifference curve is the one drawn with the thick solid line (Elena's indifference is the one drawn with the thick dashed line). Note that both indifference curves are downward sloping and with decreasing slope to reflect diminishing MRS.
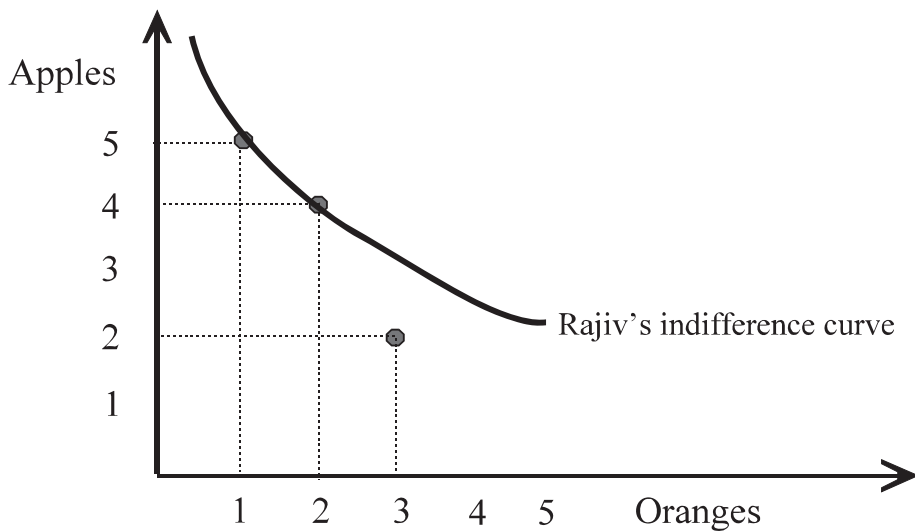
According to Rajiv's indifference curve we cannot tell whether he prefers 5 apples and 1 orange to 4 apples and 2 oranges.

B. Are other possibilities consistent with the information <u>as given in the problem statement above</u>? If so, which are they?

Yes there are. It is indeed possible to draw Rajiv's indifference curve in a way that is consistent with his preferences that 4 apples and 2 oranges are preferred to 2 apples and 3 oranges, but which would yield a different answer to question (A) above. For example, the indifference curve below implies that Rajiv prefers 4 apples and 2 oranges to 5 apples and 1 orange.

Yet another possibility is the following figure, which implies that Rajiv is indifferent between 5 applies and 1 orange and 4 apples and 2 oranges:

Problems

1. Consider a person who reports the following preferences:

$$\begin{Bmatrix} 2 & CDs \\ 1 & DVD \end{Bmatrix} \succ \begin{Bmatrix} 3 & CDs \\ 0 & DVDs \end{Bmatrix}$$

and

$$\begin{Bmatrix} 3 & CDs \\ 2 & DVDs \end{Bmatrix} \succ \begin{Bmatrix} 0 & CDs \\ 3 & DVDs \end{Bmatrix}$$

Does the utility function:

$$U(CD, DVD) = CD^2 + 10\sqrt{DVD}$$

represent this consumer's preferences ?

Yes. Plugging into this utility function the bundles listed above we get

$$U(2,1) = 4 + 10 = 14$$

$$U(3,0) = 9$$

$$U(3,2) = 9 + 10\sqrt{2} = 23.14$$

$$U(0,3) = 10\sqrt{3} = 17.32$$

On the basis of this utility, the consumer prefers the first bundle to the second, and the third to the fourth, which is precisely the preferences he reported in the first place.

Therefore, this utility function represents his preferences.