

4.2 figure it out

Jasmine can watch hours of baseball (B) or hours of reality shows (R) on TV. Watching more baseball makes Jasmine happier, but she really doesn't care about reality shows—good or bad.

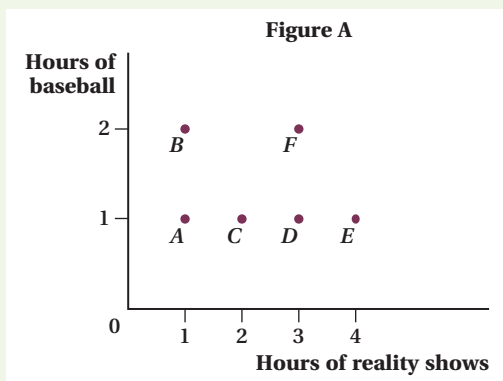
a. Draw a diagram showing a set of Jasmine's indifference curves for hours of baseball and hours of reality shows. (Put reality shows on the horizontal axis.) What is Jasmine's MRS_{RB} when she is consuming one unit of each good?

b. Write a utility function for this consumer and illustrate, using calculus, that the marginal rate of substitution of hours of reality shows for hours of baseball is zero.

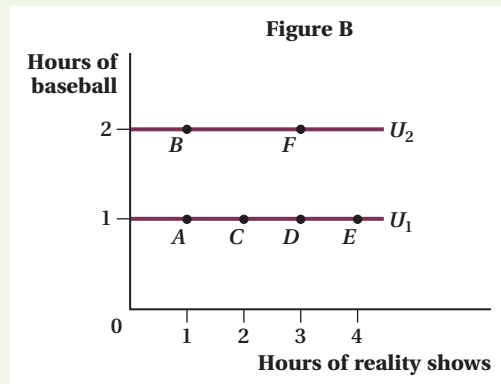
Solution:

a. The easiest way to diagram Jasmine's preferences is to consider various bundles of reality shows and baseball and determine whether they lie on the same or different indifference curves. For example, suppose she watches 1 hour of reality TV and 1 hour of baseball. Plot this in Figure A as point A . Now, suppose she watches 1 hour of reality TV and 2 hours of baseball. Plot this as point B . Because watching more hours of baseball makes Jasmine happier, point B must lie on a higher indifference curve than point A .

Now, try another point with 2 hours of reality TV and 1 hour of baseball. Call this point C . Now, compare point A with point C . Point C has the same number of hours of baseball as point A , but provides Jasmine with more reality TV. Jasmine neither likes nor dislikes reality TV, however, so her utility is unchanged by having more reality TV. Points A and C must therefore lie on the same indifference curve. This would also be true of points D and E . Economists often refer to a good that has no impact on utility as a "neutral good."



Looking at Figure A, we see that there will be an indifference curve that is a horizontal line going through points A , C , D , and E . Will all of the indifference curves be horizontal lines? Let's consider another bundle to make sure. Suppose that Jasmine watches 3 hours of reality TV and 2 hours of baseball, as at point F . It is clear that Jasmine will prefer point F to point D because she gets more baseball. It should also be clear that Jasmine will be equally happy between points B and F ; she has the same hours of baseball, and reality shows have no effect on her utility. As shown in Figure B, points B and F lie on the same indifference curve (U_2) and provide a greater level of utility than the bundles on the indifference curve below (U_1).



To calculate the marginal rate of substitution when Jasmine is consuming one unit of each good, we need to calculate the slope of U_1 at point A . Because the indifference curve is a horizontal line, the slope is zero. Therefore, MRS_{RB} is zero. This makes sense; Jasmine is not willing to give up any baseball to watch more reality TV because reality TV has no impact on her utility. Remember that MRS_{RB} equals $\frac{MU_R}{MU_B}$. Because MU_R is zero, MRS_{RB} will also equal zero.

b. Letting R represent hours of reality shows and B represent hours of baseball, a utility function that is consistent with the figure that you drew in part (a) is $U(R,B) = B$. The marginal rate of substitution can be calculated as the ratio of marginal utilities. Here, $MU_R = \frac{\partial U}{\partial R} = 0$ and $MU_B = \frac{\partial U}{\partial B} = 1$. The marginal rate of substitution then is $MRS_{RB} = \frac{MU_R}{MU_B} = \frac{0}{1} = 0$. Multiplicative transformations of this utility function also work here as solutions.