Quiz #2

with answers

1. Prior to boarding an 18-hour flight to Delhi, Elroy decides to visit an airport store to purchase books (B) and CD's (C). He has \$100 to spend on these two goods. His preferences over different quantities of books and CD's are described by the utility function $u(B,C) = 10B^4C$, so that $MU_B = 40B^3C$, while $MU_C = 10B^4$. A book costs \$8, while a CD costs \$10. Solve for Elroy's best affordable bundle of books and CD's. The answer is the solution to the following two equations:

$$\frac{MU_B}{MU_C} = \frac{p_B}{p_C}$$

$$p_B B + p_C C = Income$$

Plugging in the information given in the setup yields

$$\frac{40B^3C}{10B^4} = \frac{8}{10} \tag{1}$$

$$8B + 10C = 100 \tag{2}$$

Substituting a simplified version of (1) into (2) yields the answer,

$$B^* = 10$$

$$C^* = 2$$

2. Polonius loves pizza, but only if he gets to drink exactly 4 beers with each pizza. Likewise, he loves beer, but only if he gets to eat one pizza for every 4 beers. His utility function over beer and pizza is then given by $u(B,P) = \min\{4P, B\}$. Suppose his food/beverage budget for a month is \$300, a pizza costs \$15, and a beer costs \$1.50.

Draw a clearly-labeled graph with quantity of pizza on the horizontal axis and quantity of beer on the vertical axis containing Polonius's budget line and a couple of his indifference curves. Pay close attention to the shape of his indifference curves. As these goods are perfect complements for Polonius, your picture should have L-shaped indifference curves.

3a. Continuing with problem 2, what is the name for the type of preferences Polonius has over beer and pizza? Perfect complements.

3b. Solve mathematically for Polonius's best affordable bundle of beer and pizza. In the special case of perfect complements, the usual condition equating slopes is replaced by one equating the left and right sides of the min operator, so we have the solution satisfies the following two equations:

$$4P = B$$

$$15P + 1.5B = 300$$

Solving this system yields

$$P^* = \frac{100}{7}$$

$$B^* = \frac{400}{7}$$

It's my mistake that the answer did not work out to be whole numbers.

4. Caliban needs to buy diapers for his baby, Monty. He can either buy them for $20/package at Kroger, or he can purchase a membership at Sam's club for $100, in which case the diapers will be $15/package. Caliban can spend at most $900 on diapers. Assume Caliban would get no benefit from a Sam's Club membership other than being able to purchase cheaper diapers.

a. In a picture with quantity of diapers on the horizontal axis and spending on all other goods on the vertical axis, draw two budget lines, one for the case in which Caliban does not purchase the membership at Sam's Club, and one in which he does. Clearly label everything in your picture, and provide as much detail as possible. In answering questions like this, it is best to distort the scale of the graph to get the clearest picture.
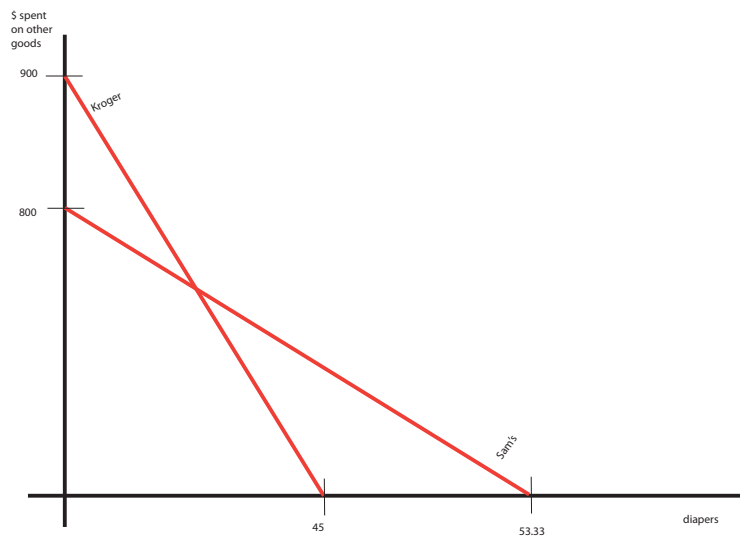
b. Redraw your picture from part a (you can omit detail to save time), and now add in a set of indifference curves such that Caliban would be better off by **not** purchasing the membership.