NTU SSS Economics HE1001
Tutorial 3 (Week 4): Consumption

1. Janice consumes two goods, X and Y. Janice has a utility function given by the expression:

$$U = 4X^{0.5}Y^{0.5}$$

The current prices of X and Y are 25 and 50, respectively. Janice currently has an income of 750 per time period.

a. Write an expression for Janice's budget constraint.

$$I = P_x X + P_y Y$$
$$750 = 25X + 50Y$$

b. Calculate the optimal quantities of X and Y that Janice should choose, given her budget constraint. Graph your answer.

We can derive the marginal utility of X and Y:

$$MU_X = \frac{2Y^{0.5}}{X^{0.5}}$$
$$MU_Y = \frac{2X^{0.5}}{Y^{0.5}}.$$

Then:

$$MRS = \frac{P_X}{P_Y}$$

$$MRS = \frac{MU_X}{MU_Y} = \frac{2}{2} \quad \frac{\frac{Y^{0.5}}{X^{0.5}}}{\frac{X^{0.5}}{Y^{0.5}}}$$

$$MRS = \frac{Y}{X}$$
$$\frac{P_X}{P_Y} = \frac{25}{50} = \frac{1}{2}$$

Equating MRS to $\frac{P_X}{P_Y}$:

$$\frac{Y}{X} = \frac{1}{2}, \quad Y = \frac{1}{2}X$$

Janice should buy 1/2 as much Y as X.

Recall 750 = 25X + 50Y

Substitute Y by X/2

750 = 25 X + 50 * X/2

750 = 25X + 25X

750 = 50X

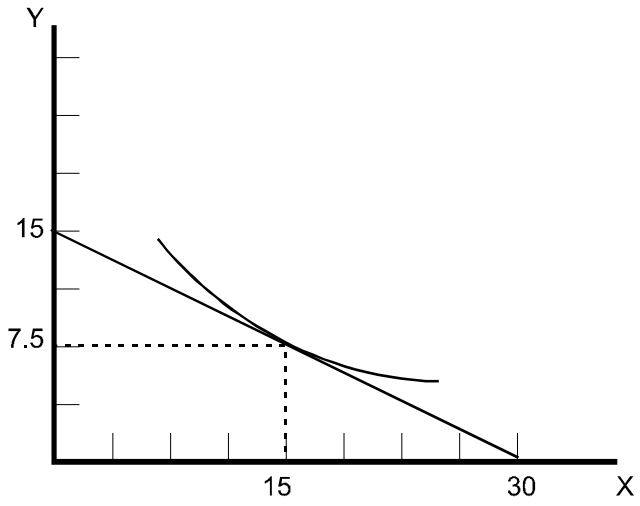
X = 15

Y = X/2

Y = 15/2

Y = 7.5

Janice should consume 7.5 units of Y and 15 units of X.

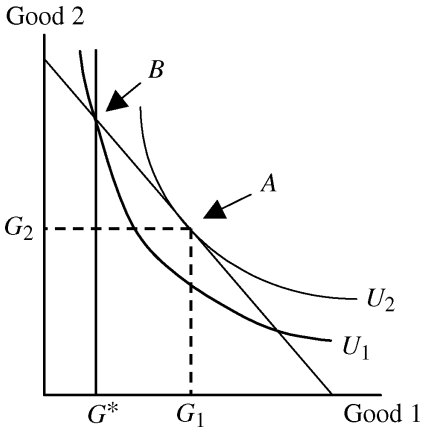


2. Draw a budget line and then draw an indifference curve to illustrate the satisfaction-maximizing choice associated with two products. Use your graph to answer the following questions.

a. Suppose that one of the products is rationed. Explain why the consumer is likely to be worse off.

When goods are not rationed, the consumer is able to choose the satisfaction-maximizing bundle where the slope of the budget line is equal to the slope of the indifference curve, or the price ratio is equal to the *MRS*. This is point *A* in the diagram below where the consumer buys G_1 of good 1 and G_2 of good 2 and achieves utility level U_2. If good 1 is now rationed at G^* the consumer will

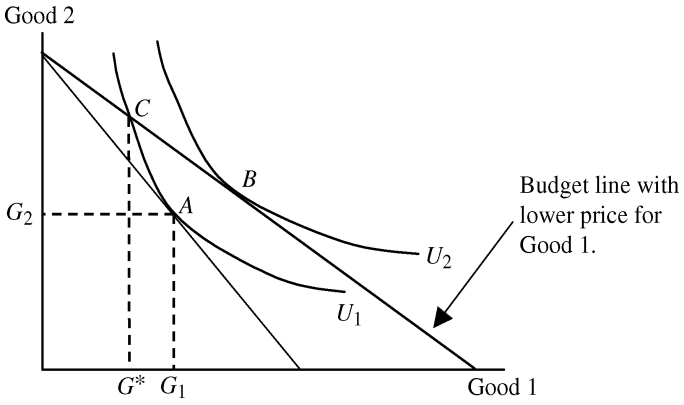
no longer be able to attain the utility-maximizing bundle A. He or she cannot purchase amounts of good 1 exceeding G^*. As a result, the consumer will have to purchase more of the other
good instead. The highest utility level the consumer can achieve with rationing is U_1 at point *B*. This is not a point of tangency, and the consumer's utility is lower than at point *A*, so the consumer is worse off as a result of rationing.



b. Suppose that the price of one of the products is lowered from the current price. Would the consumer be better off or worse off?

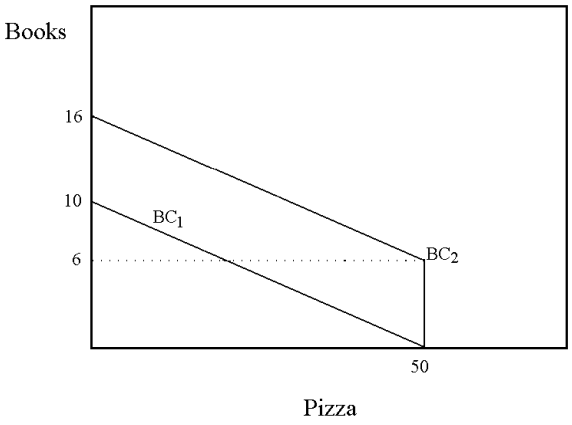
The consumer would be better off if they can buy more of the good at the new low price.

[For market equilibrium tutorial: Add to question "Price is fixed at one that is lower than the current equilibrium price" and "As a result, the consumer is not able to purchase as much as she would like. However, when the price of one good is artificially fixed at a level below the current (equilibrium) price, there will be a shortage of that good, and the good will be effectively rationed. In the diagram below, the price of good 1 has been reduced, and the consumer's budget line has rotated out to the right. The consumer would like to purchase bundle *B*, but the amount of good 1 is restricted because of a shortage. If the most the consumer can purchase is *G**, she will be exactly as well off as before, because she will be able to purchase bundle *C* on her original indifference curve. If there is more than *G** of good 1 available, the consumer will be better off, and if there is less than *G**, the consumer will be worse off.]



3. Bobby is a university student who has $500 of income to spend each semester on books and pizzas. The price of a pizza is $10 and the price of a book is $50. Diagram Bobby's budget

constraint. Now, suppose Bobby's parents buy him a $300 gift certificate each semester that can only be used to buy books. Diagram Bobby's budget constraint when he has the gift certificate in addition to his $500 income. Is Bobby better-off with the gift certificates?



Without the gift certificate, Bobby's budget constraint is indicated by the line segment from 10 books and 0 pizza to 0 books and 50 pizzas (labeled BC1). With the gift certificate that can only be used for book purchases, Bobby still cannot afford any more than 50 pizzas. However, **he is guaranteed 6 books even if he spends all his money on pizza**.

Since the price of books and pizza hasn't changed, the slope of his new budget constraint is the same as the slope of the old budget constraint. The new budget constraint is drawn above as BC2. Note that with the gift certificate, Bobby has an expanded opportunity set and is guaranteed more of both goods no matter what his original consumption choice on BC1 was. This implies that Bobby is strictly better-off with the gift certificate.