

Problem Set #3

1. Venus Williams likes both tennis rackets and tennis shoes. She has many of both. Her marginal rate of substitution (MRS) of rackets for shoes is 3, meaning that given the opportunity, she is willing to trade 3 tennis rackets for 1 pair of shoes, or vice versa. Unused rackets and shoes may be returned to the local sporting goods store for a refund. The current price for a racket is \$200 and the price for a pair of shoes is \$100. Suggest a way for Venus to make herself better off.
2. A government considers two policy options, (i) a cash grant of \$100 and (ii) a certificate good for \$100 worth of food. Is a wealthy person more likely than a poor person to prefer the cash grant? Explain using graphs.
3. Stuart's utility function for goods X and Y is represented as $U(X, Y) = X^{0.2}Y^{0.8}$. Assume his income is \$100 and the prices of X and Y are \$10 and \$20, respectively.
 - a. Express his marginal rate of substitution (MRS) between goods X and Y . As the amount of X increases relative to the amount of Y along the same indifference curve, does the MRS increase or decrease? Explain.
 - b. What is his optimal consumption bundle (X^*, Y^*) , given income and prices of the two goods?
 - c. How will this bundle change when all prices double and income is held constant? When all prices double AND income doubles?
 - d. Derive the demand curve for good X and demand curve for good Y .
Now a government subsidy program lowers the price of Y from \$20 per unit to \$10 per unit.
 - e. Calculate and graphically show the change in good Y consumption resulting from the program.
 - f. Graphically show the change in consumption attributable to the separate income and substitution effects.
 - g. Show (graphically) how much the program cost the government.
4. Isobel considers peaches and nectarines to be perfect substitutes. She spends \$5 a month on these fruits. Initially, peaches are \$1 a pound and nectarines are \$1.25 a pound. Then, the price of peaches increases to \$1.50 a pound. Her income allocated to fruit does not change, however.
 - a. How does consumption change when the price of peaches changes?
 - b. Show with the aid of a graph how utility changes when the price changes.
 - c. How much must her budget increase in order to return to the original utility level?
 - d. Derive and graph the demand curve for nectarines.
 - e. Derive and graph the Engel curve for nectarines (under the assumption that the price of peaches is \$1.50 a pound).
5. Twenty years ago, Dmitri consumed bread which cost him 10 kopeks a loaf and potatoes which cost him 13 kopeks a sack. With his income of 266, he bought 11 loaves of bread and 12 sacks of potatoes. Today he has an income of 510. Bread now

costs him 20 kopeks a loaf and potatoes cost him 20 kopeks a sack. Assuming his preferences haven't changed, when was he better off? Explain.

6. Prudence maximized her utility subject to her budget constraint. Then prices changed. After the change, she became better off. Therefore we can conclude that the new bundle costs more at the old prices than the old bundle did. True or false? Explain.