

Eco 300 Intermediate Micro

Homework 2

1. Suppose David spends his income ( $I$ ) on two goods,  $x$  and  $y$ , whose market prices are  $p_x$  and  $p_y$ , respectively. His preferences are represented by the utility function  $u(x, y) = \ln x + 2 \ln y$  ( $MU_x = 1/x$ ,  $MU_y = 2/y$ ).

a. Derive his demand functions for  $x$  and  $y$ . Are they homogeneous in income and prices?

b. Assuming  $I = \$60$  and  $p_x = \$1$ , graph his demand curve for  $y$ .

c. Repeat part (b) for the case in which  $p_x = \$2$ .

2. David gets \$3 per week as an allowance to spend any way he pleases. Since he likes only peanut butter and jelly sandwiches, he spends the entire amount on peanut butter (at \$0.05 per ounce) and jelly (at \$0.1 per ounce). Bread is provided free of charge by a concerned neighbor. David is a picky eater and makes his sandwiches with exactly 1 ounce of jelly and 2 ounces of peanut butter. He is set in his ways and will never change these proportions.

a) How much peanut and jelly will David buy with his \$3 allowance per week?

b) Suppose the price of jelly increases to \$0.15 per ounce. How much of each commodity would be bought?

c) By how much should David's allowance be increased to compensate for the rise in the price of jelly in part b?

d) Graph your results of part a through part c.

e) In what sense does this problem involve only a single commodity? Graph the demand curve for this single commodity.

f) Discuss the results of this problem in terms of the income and substitution effects involved in the demand for jelly.

3. Consider the function  $y = 2x^2 + x$  for which  $dy/dx = 4x + 1$ . Calculate the elasticity of  $y$  with respect to  $x$  at  $x = 2$ .

4. In order to reduce farm output, raise farm prices, and thus raise farm incomes (revenues), the government pays farmers to set aside a portion of their land from production. Using a graph, explain in terms of the elasticity of demand for farm products why farmers may be better-off when harvests are low even if we ignore the money they receive from the set-aside program.

5. Suppose the quantity of good  $X$  demanded by individual 1 is given by

$$X_1 = 10 - 2P_X + 0.01I_1 + 0.4P_Y$$

and the quantity of  $X$  demanded by individual 2 is

$$X_2 = 5 - P_X + 0.02I_2 + 0.2P_Y$$

a) What is the market demand function for total  $X$  ( $= X_1 + X_2$ ) as a function of  $P_X$ ,  $I_1$ ,  $I_2$ , and  $P_Y$ .

b) Graph the two individual demand curves (with  $X$  on the horizontal axis,  $P_X$  on the vertical axis) for the case  $I_1 = 1000$ ,  $I_2 = 1000$ , and  $P_Y = 10$ .

c) Using these individual demand curves, construct the market demand curve for total  $X$ . What is the algebraic equation for this curve?

d) Now suppose  $I_1$  increases to 1100 and  $I_2$  decreases to 900. How would the market demand curve shift? How would the individual demand curves shift? Graph these new curves.

e) Suppose  $P_Y$  rises to 15. Graph the new individual and market demand curves that would result.