Homework 4

Intermediate Micro - Fall 2009 – Mark Dean

Due Thursday 8th October

Please remember to answer each question on a separate sheet of paper

Please remember to put your name and Banner ID on each sheet of paper

Question 1 (Cobb Douglas Preferences)

In general, Cobb Douglas refer to any preferences that can be described by a utility function of the form $u(x_1,x_2)= (x_1)^a(x_2)^b$ for a>0 and b>0. Lets think of good 1 as bags of flour and good 2 as gallons of milk

    (a) *Calculate the demand function for Cobb Douglas preferences – i.e. calculate the amount of each good that will be demanded as a function of the p_1, p_2 and m*

    (b) *Calculate the price elasticity, income elasticity and cross elasticity of demand for each good. (Note that these elasticities should only be functions of the parameters of the problem – prices and incomes, not of the x's)*

    (c) *Are these goods normal or inferior for these preferences? Are they price elastic or inelastic?*

    (d) *Imagine that some meddling bureaucrat now insists that we now price good 1 in half bags of flour, so now we have to use $2q_1= p_1$ as our price. This means that our budget constraint is now $2q_1 x_1+ p_2 x_2=M$ and the tangency condition is now*

$$\frac{\frac{\partial u(x_1,x_2)}{\partial x_1}}{\frac{\partial u(x_1,x_2)}{\partial x_2}}=\frac{2q_1}{p_2}$$

    Does this change in units effect the change in demand with respect to price? Does it affect the price elasticity of demand?

Question 2 (Inferiority)

If preferences are monotonic and there are only two goods in the world, is it possible for both good one and good two to be inferior?

Question 3 (Elasticity and Tax)

Gwendolyn has quasilinear preferences between tangerines and eggs of the form $u(x_e,x_t)=$ $x_e+(x_t)^a$ with $0<a<1$

(a) Show that Gwen's demand for tangerines (assuming an interior solution) is given by

$$x_t = a^{\frac{1}{1-a}} (\frac{p_e}{p_t})^{\frac{1}{1-a}}$$

(b) Show that the price elasticity of demand for tangerines is equal to $1/(1-a)$. Are tangerines price elastic or inelastic?

(c) In a blatant revenue-grab, the government introduce a tangerine-tax of $t>1$ (so the price of tangerines is now tp_t. What is the new demand for tangerines? How much revenue does the government get from the tangerine tax?

(d) Say the government increases the tax from t to s. What is the percentage change in revenue? Is it greater than less than zero?

(e) How is the answer to (d) affected by the price elasticity?

(f) Explain why this may provide an incentive for government to tax cigarettes

Question 4 (Labor Supply)

Maeve was working as a waitress in a cocktail bar. She earns a wage of w for each hour she works, and she spends her money on maths lessons, which cost $1 per hour.

(a) Write down Maeve's optimization problem (assume that the two commodities are leisure (the hours she doesn't work) and maths lessons, and she has a utility function over these two commodities). **Hint: what is Maeve's constraint? How many hours are there in the day**

(b) Draw Maeve's budget set

(c) Imagine Maeve changes jobs to a superior establishment, and now earns wage $v>w$ per hour. Will Maeve necessarily work more at this new establishment? Draw a picture or use the Slutsky equation to answer the question