ECON 402 Summer 2006

Assignment 1: due Tuesday May 21

1. You are to use Silberberg/Suen (or any other source) as a reference to help you answer and explain the following. To answer these questions it will take a combination of research and clever reasoning.

   (a) What are homogeneous and homothetic functions? What properties do they share in common? How do they differ? When would an economist prefer one over the other when building an economic model?

   (b) Based on your answer to (a), consider the implications for individual demand functions derived from a homogeneous utility function in a two good world; specifically:

      1. What does it imply about income elasticity of demand for each good?
      2. Why is it that the demand functions from this type of utility function can never be linear?

   (c) What is Euler's Theorem?

   (d) Suppose a perfectly competitive, profit maximizing firm has only two inputs, capital and labour. The firm can buy as many units of capital and labour as it wants at constant factor prices r and w respectively; i.e.

   $$\pi = pf(K, L) - wL - rK$$

   If the firm's production function has constant returns to scale, use Euler's theorem to show that in long-run equilibrium the firm earns zero profits.
   (hint: look at the first order conditions for profit maximization)

2. Myrtle has the following maximization problem

   $$\text{Max} \quad u = x^{1/3}y^{2/3} \quad \text{subject to} \quad B = p_x x + p_y y$$

   where x and y are quantities of two consumption goods whose prices are p_x and p_y respectively. Myrtle has a budget of B.

   (a) From the first order conditions find expressions for the demand functions $x^* = x(p_x, p_y, B)$, $y^* = y(p_x, p_y, B)$

   (b) Verify that Myrtle is at a maximum by checking the second order conditions.

   (c) By substituting your solutions into the utility function, find an expression for the indirect utility function, $u^* = u^*(p_x, p_y, B)$. Re-arrange the indirect utility function to find an expression for the Expenditure Function,$B^* = B^*(p_x, p_y, u^*)$
   Myrtle's problem could be recast as the following:

   $$Minimize \quad p_x x + p_y y \quad s.t. \quad u_0 = x^{1/3}y^{2/3}$$

   where U_0 is equivalent to the maximum utility obtained from the above problem

   (d) Find the values of x and y that solve this minimization problem.

   (e) Check the second order conditions to verify you have a minimum

   (f) Show that your solution to x from the minimization problem is equal to $\frac{\partial B(p_x, p_y, U_0)}{\partial p_x}$ from part **(c).**