Problem Set #5
Problem Set Due Session 10

1)  Suppose fast food firms have production functions of the form:

$$Q = G(FM, Teen)$$

Where: Q is the quantity of fast food produced per week,

FM is the number of frying machines leased per week

Teen is the number of teenagers, ages 16-19, employed per week.

Let V be the cost of leasing a frying machine for a week and W be the wage required to hire a teenager for a week. Assume the production function, G(   ) allows for normal substitution between frying machines and teenagers – i..e. it produces standard "curved" isoquants rather than the "right angle" isoquants of the one-person-sitting-at-one-PC example we discussed in class.

a) Draw a set of diagrams which shows how we begin with isoquants and isocost lines and cost minimization and then move to the total, average and marginal cost curves for a fast food firm. Carefully show how you move from one diagram to the next – for example, what information you take from the isoquant/isocost diagram to construct the total cost curve.

b) One factor in computer penetration of the economy is the rapidly falling price of computers. Consider a similar situation here. Suppose technological change causes large fall in V, the cost of the weekly leasing rate for a frying machine for a week. Carefully show how this fall in V will influence each of the curves you have drawn in (a) - the isoquants, the isocost lines, the total cost curve, the average cost curve and the marginal cost curve

c) We haven't talked explicitly about the demand for fast food – something we need to do if we are going to determine output. Nonetheless, we are going to ask you to speculate. Assume consumer demand for fast food is very inelastic. Given this assumption and your work in (b) above, speculate on whether the falling lease cost of frying machines will result in the fast food industry hiring more labor or less labor. Briefly explain your answer. If, instead, the consumer demand for fast food was highly *elastic,* would that affect your thinking? Explain why or why not.

2) When we use U.S. Census data to compare women's occupational distributions for 1980 and 2000, we see a sharp fall in the proportion of women who work as secretaries. A priori, there are two plausible explanations for this decline:

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- Technical Change – in particular, word processing – has allowed more individuals to do their own manuscript preparation and so has lowered the demand for secretaries.

- Declining Gender Discrimination - Employment opportunities for women have expanded and so women are increasingly moving away from secretarial jobs and into occupations like law, finance, marketing, etc.

a) Assume that only one of these explanations is correct. Draw the supply-demand graph for the secretaries' market implied by each explanation and briefly describe in words how you can distinguish between the two cases.

b) Most jobs consist of a collection or "bundle" of tasks. The computerization of work often proceeds by "unbundling" a job so that computers substitute for humans in performing some of the jobs tasks even as they complement humans - i.e. improve human performance – in some of the other tasks.

Consider the job of Exceptions Processing clerks in the Upstairs Downstairs banking paper. In this job, which human tasks did computers substitute? Why didn't computers substitute for the entire job? Is it fair to say that computers complemented the work of the clerks? Explain.

2) Black pepper is produced in a perfectly competitive industry in which all growing is done on one-acre farms and each farm has the same cost curves. In these cost curves, average cost reaches a minimum of $1.50 per pound at an output of 2,000 pounds per acre. As late as August 2002, the market was in equilibrium. As you would expect, demand in the national black pepper market is quite inelastic with respect to price.

In September 2003, the U.S. Department of Agriculture Web Site began to display a new technology for growing pepper. Under the new technology, average cost reaches a minimum of $1.40 per pound at an output of 4,000 pounds per acre.

a) Draw both the pepper industry equilibrium and the equilibrium for an individual farm as of August 2003. Be as specific with respect to price, the quantity produced by the individual farm, etc. as you can.

b) How, if at all, would you expect the Web Site information to change your farm and industry equilibrium in (a)? Include in your discussion such variables as the output of the typical farm, total industry output, the number of firms in the industry and any other measures you think are relevant. Explain your reasoning and illustrate your answer with appropriate diagrams.

c) Suppose that the industry demand curve for pepper had an elasticity of -3.2. How, if at all, would this change your answers in (b)?

4) Cloves are a well known spice that is grown only in Zanzibar, a small island off the coast of

East Africa. Suppose that the entire clove industry consists of 1,000 farms who act as perfect competitors. Each of these 1,000 farms can grow other crops if the clove market is weak. But no other farms, inside or outside of Zanzibar are suitable for growing cloves.

Each of the 1,000 farms has the same technology with these characteristics:

- Each farm has a maximum capacity of 1,000 pounds of cloves.

- Each farm achieves its minimum average cost at an output of 500 pounds of cloves, at which point the average cost is $7.00 per pound.

a)  On January 1, 2003, the market price for cloves is $7.14 per pound. Using appropriate diagrams carefully draw this equilibrium for both the clove industry and for the typical clove farm, incorporating as much detail as the problem description allows.

b) It seems reasonable to assume that a farmer will make the most profit if he/she produces at the output at which average cost is minimized. Does that apply to those farms that are growing cloves in (a) above? If not, briefly explain why.

c) When a competitive industry is in equilibrium, it often occurs that only some of the firms in the industry are actually producing while other potential firms are sitting on the sidelines perhaps producing other goods. Explain why there is not enough information in the problem to determine whether all potential farms are producing cloves or not.

d) Suppose you were told that the price of cloves had been stable at $7.14 per pound since July 1998. Would this cause you to change your answer in (c)?

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