

Finance 510 Problem Set #3

- 1) Suppose that you are a firm that produces xylophones. You have a production technology to produce xylophones that can be written as:

$$y = k^{\frac{1}{2}} l^{\frac{1}{2}}$$

Where k represents the units of capital employed at your production facility, l is the number of labor hours employed and y is your total production of xylophones. Assume that labor costs \$10 per hour and that capital costs \$250 per unit.

- a) Suppose that you are currently employing 100 units of capital. If you have expected sales equal to 1,000, calculate your optimal choice of labor.
 - b) Given your answer to part (a), calculate your marginal cost of production.
 - c) Given your answer to part (a), Calculate your average cost of production (i.e. unit cost)
 - d) Now, assume that you are allowed to adjust your scale of operations (that is, you are allowed to choose both capital AND labor). Calculate the optimal levels of both capital and labor.
 - e) Given your answer to (d), calculate your marginal cost of production.
 - f) Given your answer to (d), calculate your average cost of production.
 - g) Show that in the long run (i.e. when capital is adjustable), this firms expenditures will be 50% labor costs, 50% capital costs.
- 2) Suppose that you have two industries, each of which has its own production function

Industry A: $y_A = k_A^{.25} l_A^{.35}$

Industry B: $y_B = k_B^{.55} l_B^{.65}$

- a) Describe what each industries marginal costs should look like in the short run (i.e. when capital is fixed) – specifically, which industry's marginal costs are increasing at a faster rate?
- b) If both of these industries are perfectly competitive, which industry should have a lower elasticity of supply (price elasticity)

- c) What should these two industry's cost functions look like in the long run (i.e. when capital adjustments can be made)?
 - d) Which of the two industries would you expect to be monopolized by one or a few firms? Why?
- 3) Suppose that you are operating a firm with constant marginal costs of production equal to \$5 and no fixed costs. You are facing a demand with a constant price elasticity of -3.
- a) Calculate your optimal (i.e profit maximizing) price.
 - b) What would your firm's Lerner index be?
 - c) Due to easy entry to the market, you would expect your industry to become more competitive over time. What should happen to your profit maximizing price in the long run?
- 4) Suppose that you have an industry with 5 firms. Below are the market shares of each firm:

Firm	Market Share
1	35
2	25
3	15
4	15
5	10

- a) Calculate the concentration ratios for this industry.
- b) Calculate the Herfindahl-Hirschman index for this industry.