

Finance 360 Problem Set #4

- 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 (a), calculate your average cost of production.
 - d) Now, assume that you can adjust your capital as well as labor. Calculate your optimal capital/labor choice.
 - e) Calculate your long run average cost and marginal cost.
 - f) Show that in the long run, your expenditures will be 50% capital costs and 50% labor 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 industry's 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.