The Ohio State University
Department of Economics
Final Examination

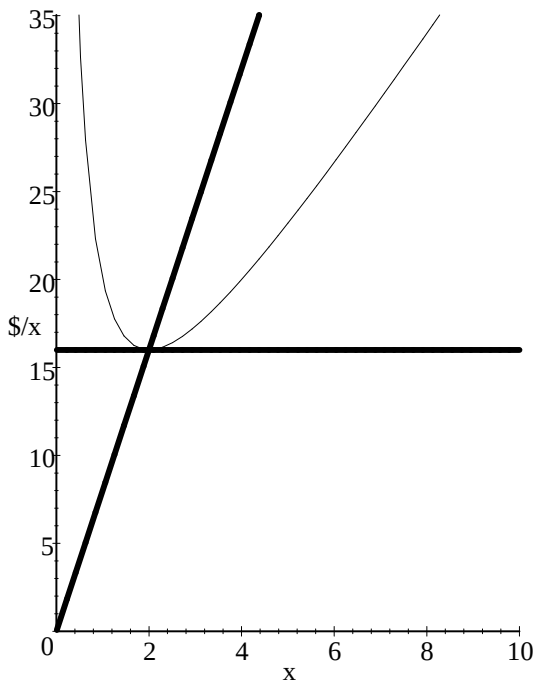
Econ 501a
Winter 2002
Prof. James Peck

Directions: *Answer all questions, show all work, and label all graphs.*

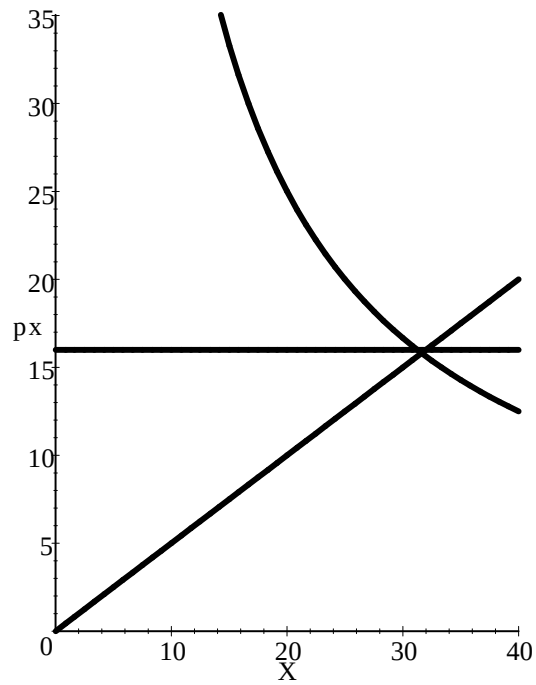
1. (10 points) True or false, and explain:
"Every point on IBM's long-run average cost curve corresponds to a point on *one* of IBM's short-run average total cost curves."

2. (15 points)

Consider a perfectly competitive industry in which all firms have the cost functions depicted below. The market is originally in short-run and long-run equilibrium. If the price of capital increases, in what direction (increase, decrease, or no effect) do the equilibrium prices and quantities move in the short run and in the long run?



Firm's Cost Curves



Original Market Equilibrium

3. (10 points) True or false, and explain with a graph and brief verbal explanation.

"A tax of one dollar per unit of output reduces the surplus received by producers and consumers, but the private sector's loss exactly equals the tax revenue received by the government."

4. (15 points) What would be the Nash equilibrium of a *price-competition* game played by two firms with different costs? Suppose that firm 1 has constant marginal costs equal to 20, and firm 2 has constant marginal costs equal to 30. The rules of the game are as follows. First, both firms simultaneously choose their price. Next, consumers who wish to purchase buy from the firm offering the lower price. If both firms set the same price, each firm sells half the total quantity demanded by the market at that price.

What price will each firm charge at the Nash equilibrium?

5. (30 points)

The market for xylophones is perfectly competitive, and all firms have the production function,

$$x = K^{1/3}L^{2/3},$$

where x is the quantity of xylophones produced, K is the capital input, and L is the labor input. The market demand curve for xylophones is given by

$$X^d = 2500 - 5(p_x)^2.$$

(a) If a firm's capital stock is fixed at one unit in the short run, $\overline{K} = 1$, find the equation for the firm's short-run supply curve.

(b) Suppose that, in the short run, there are 720 firms, each with one unit of capital, $\overline{K} = 1$. Calculate the short-run equilibrium values of p_x and x.

(c) In the long run, firms can choose the values of both K and L, and can freely enter or exit the industry. Calculate the long-run equilibrium values of p_x and x.

6. (20 points)

Louisiana Spice Corporation is a monopolist in the market for certain specialty cajun spices. Letting x denote the quantity of output produced, Louisiana Spice's total cost function is given by

$$TC = 100 + 30x.$$

Louisiana Spice's customers are restaurants specializing in cajun food, mostly in the New Orleans area. The market demand curve is given by

$$x^d = 50 - p_x.$$

(a) Calculate Louisiana Spice's profit maximizing output level and price. What will be the firm's profits?

(b) Calculate the most money that Louisiana Spice would pay for an innovation that lowers its cost function to TC', given by

$$TC' = 100 + 20x.$$