MBA 603 Exam
September 2009

Name: ___KEY___

100 points total. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (10 pts.) Currently the market price of gasoline is $2.38 per gallon in Lexington. Suppose city council votes to make it illegal for any gasoline retailer to sell at a price higher than $3.00 per gallon, i.e. they impose a price ceiling or maximum price at $3. Illustrate and explain briefly what the effect of this policy will be on the market for gasoline.
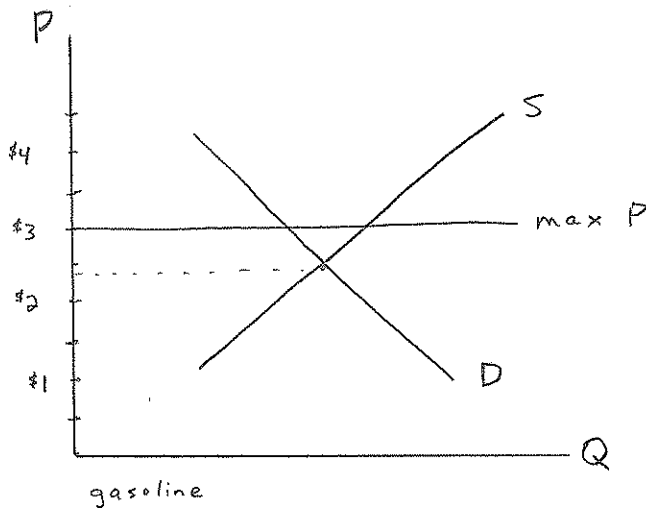

a price ceiling or maximum price that is above the current market-clearing price will have no effect.

2. (5 pts.) Small investment with major return: "Start making your own coffee to take to work each morning. Cost: $20 for a Thermos, $10 for a filter and papers, and $60 a year for ground coffee. Then skip the $4 a day drive-thru. If that saves you $1,000 a year, the return is more than 1,000%." Briefly evaluate the logic of this suggestion.

The implicit cost of labor is ignored in this calculation. If one includes the opportunity cost of one's time (sleep, rushing to get ready for work), then it is obviously cheaper for many people to purchase coffee rather than make their own.

3. (10 pts.) From the *WSJ*, 9/3/09: As a result of the worldwide recession, global champagne sales are expected to fall from 322 million bottles in 2008 to 260 million bottles this year. Champagne makers like LVMH Moet Hennessy Louis Vuitton SA are contemplating price cuts to soften the blow of the decreased demand for champagne. Their marketing research departments have estimated the own-price elasticity of demand for champagne to be 1.5. By what percentage do champagne makers need to reduce their prices in order to keep sales volume the same in 2009 as it was in 2008? Illustrate what is going on in the diagram below.
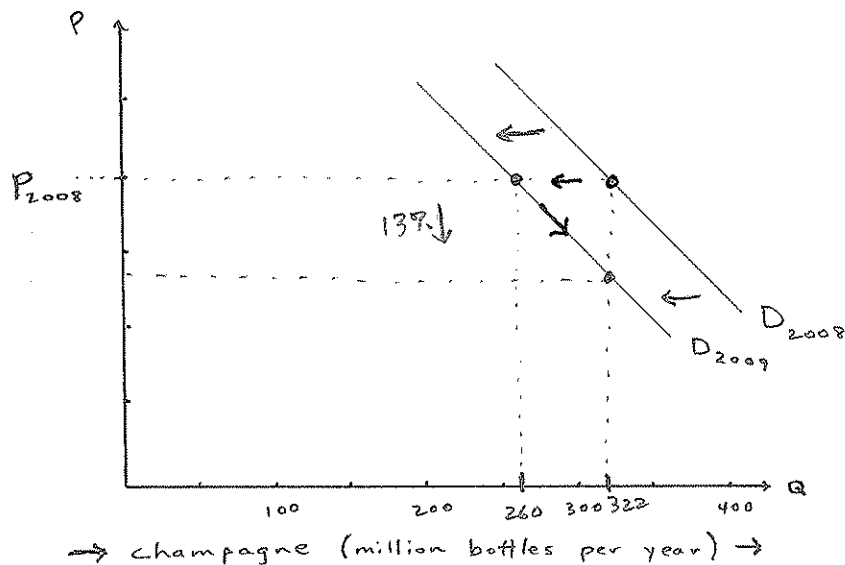
Recession causes demand for champagne to shift to the left, and quantity sold falls from 322 m to 260 m, a decline of roughly 20%:

$$\frac{62}{322} \approx 20\%.$$

$$E_{x,P_x} = \frac{\% \Delta Q}{\% \Delta P} : \frac{20}{\% \Delta P} = 1.5$$

$$\% \Delta P \approx 13\%$$

To keep sales volume the same we must cut price by 13%.

4. (10 pts.) In the major champagne consuming regions of the world, per capita incomes are estimated to have fallen by 5% over the last year or so. What is the income elasticity of demand for champagne? What does that tell you about the type of good champagne is?

$$E_{x,I} = \frac{\% \Delta X}{\% \Delta \text{Income}} = \frac{20\%}{5\%} = 4$$

$E_{x,I} > 1$ for champagne, so it is a luxury good.

5. (10 pts.) In your lawn-care business, your production process is described by the following production function: $Q = L^{1/2}K^{1/2}$, where Q is the number of acres of lawns you mow in an hour, L is the number of person hours of labor used, and K is the number of lawn mowers used. Does your production process exhibit increasing returns to scale, constant returns to scale, or decreasing returns to scale? Use a numerical example to explain your answer.

$$Q = L^{1/2} K^{1/2}$$

| L	K	Q
1	1	1
2	2	2
4	4	4

$Q = \sqrt{1} \cdot \sqrt{1} = 1$

$Q = \sqrt{2} \cdot \sqrt{2} = 2$

$Q = \sqrt{4} \cdot \sqrt{4} = 4$

Double all inputs produces a doubling of output. So constant returns to scale.

6. (10 pts.) Use the concept of a long-run average cost curve to explain why a primary aluminum producer like Century Aluminum Co. would want to close a plant with annual capacity of 170,000 tons and shift that production to a plant with 260,000+ tons of annual capacity. Illustrate your answer.

aluminum (tons per year)
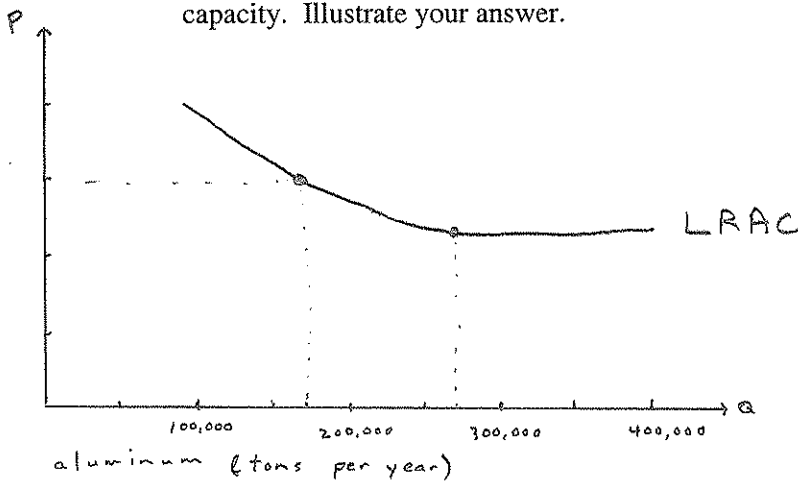
If minimum efficient scale (MES) for aluminum production occurs at outputs greater than 170,000 tons per year, then a smaller scale plant will not be cost-competitive with a larger scale plant.

7. (10 pts.) After Burton Denson graduated with honors from the American Trucking Academy, his proud (and rich) parents gave him a new $350,000 tractor-trailer rig. At a recent class reunion of ATA alums, Burton boasted to some fellow truckers that his revenues were typically $25,000 per month, while his operating costs (fuel and maintenance) amounted to only $18,000 per month. The other truck drivers are all employees of various trucking companies, and bemoaned the fact that they are only averaging $5,000 per month in salary and benefits, while Burton is taking home $7,000. They wish that they had rich parents so that they could be in business driving their own rigs like Burton. Since you are attending the class reunion with your spouse, who is also an alumna of the ATA, you overhear this conversation. Your spouse turns to you and says, "OK Mr./Ms. MBA student, I'm driving trucks across the country to put you through school, what do you think of this guy's reasoning? Why don't we take the $350,000 we have in mutual funds and cash it in, and buy me a rig of my own. Then I can quit driving for J. B. Hunt Trucking Co. and work for myself like Burton." How do you answer your spouse? (Hint: this questions calls for an evaluation of the economic profitability of being an independent trucker.)

"Two things to consider:

① interest earnings foregone on $350,000 that was invested in mutual funds. Even at 5%, this generates almost $1500 per month in income.

② depreciation on a new truck. If the truck lasts ten years, it is depreciating by $35,000 per year (if depreciation is linear), or almost $3000 per month.

Add these two implicit costs to the opportunity cost of your time ($5000 per month), and Burton's $7000 per month net revenue as an owner-operator doesn't look so good!"

8. (5 pts.) Besides mechanical potato chip dryers, name one other way Frito-Lay is responding to higher energy costs.

- corn-washing nozzles reduce water usage
- lobbied Ga. legislature for 57 foot trailers
- switched to Toyota Priuses
- considering alternative fuels for boilers
- changing temperatures inside ovens

9. (5 pts.) Contrast Honda and General Motors in terms of the fixed set-up costs at their factories and the lengths of their production runs.

Honda has built its factories so that it is easy to change from one car to another — low set-up costs. GM's factories are very costly to switch over from one model to another — large initial set-up costs. Result is that Honda finds it cost effective to have shorter production runs, enabling it to better match production of different models with consumer demand.

10. (10 pts.) Bauxite mining and alumina refining are the first two stages in the vertical chain of production in the aluminum industry. What is typically the nature of the vertical connection between these two stages? What economic reason can you think of that might explain how the make or buy decision is made between these two stages of production? Briefly explain.

Bauxite mining and alumina refining both involve large irreversible investments in specific capital assets. The reason for the asset specificity is locational — site specificity — because bauxite is costly to transport. Thus there is a cost advantage in locating an alumina refinery close to the bauxite mine. So that neither the owner of the bauxite mine nor the owner of the alumina refinery is vulnerable to being held up, it makes sense for them to be owned by the same entity — vertical integration. This is why we typically see vertical integration between these two stages of production.

11. (5 pts.) What sorts of activities has Boeing outsourced in the production of the new Dreamliner 787? How has it worked out?

Boeing has outsourced the production of the wings, the fuselage, the engines, and many other parts of the 787. It has worked out poorly, as evidenced by the numerous delays in getting the plane airborne.

12. (10 pts.) A firm contemplating entering the breakfast cereal market would need to invest $100 million to build a minimum efficient scale production plant (or about $10 million annually on an amortized basis.) Such a plant could produce as much as 100 million pounds of cereal per year.

    a) What would be the average fixed costs of this plant if it ran at capacity?

$$\frac{\# 10,000,000}{100,000,000 \ lbs} = \$.10 \ per \ pound.$$

$$AFC = \frac{TFC}{Q} = 10\cancel{c} \ per \ pound \ if \ the$$

plant runs at full capacity

    b) Each year U.S. breakfast cereal makers sell about 3 billion pounds of cereal. What would be the average fixed costs if the cereal maker captured a 2 percent market share? What would be the cost disadvantage if it only captured 1 percent of the market?

$$2\% \ of \ market = .02 \cdot 3,000,000,000$$

$$= 60,000,000$$

$$AFC = \frac{\$10,000,000}{60,000,000 \ lbs} = 16.7 \cancel{c} \ / \ lb$$

$$1\% \ of \ market: \ AFC = \frac{\$10,000,000}{30,000,000} = 33.3 \cancel{c} \ / \ lb.$$

So the cost disadvantage would be $16.7 cents on a one-pound box of cereal.