

3. (10 pts.) Doughdaddy is contemplating the input mix he is currently using to make doughnuts in his doughnut shop. Keeping the same number of workers, if he were to upgrade his deep-fat fryer from the current medium size to a large-sized one, daily output of doughnuts would increase by 200 doughnuts. The additional daily cost of leasing the large rather than the medium fryer would be \$25. Alternatively, Doughdaddy could increase output by 400 doughnuts per day by adding another worker to the production process. Each additional worker-day costs him \$80. Is Doughdaddy using the cost-minimizing mix of capital and labor to produce doughnuts? If he wants to increase output, should he use relatively more capital or relatively more labor?

4. (5 pts.) In northern Chinese cities like Beijing, apartment residents often open their windows in the winter because their heating systems give off so much heat. In southern cities like Wuhan, residents shiver under blankets in the winter because they have no heat. How did this situation arise?

5. (25 pts.) In the past year gasoline prices have increased roughly from \$3 to \$4 per gallon. In response Americans drove 9.66 billion fewer miles in May than in the same month a year earlier, a 3.7% decline. Bus ridership in Fort Wayne, IN was up 16% in the first six months of this year, compared with the year-ago period, even though the city kept bus fares constant.
- a) Illustrate and briefly explain what has happened in the market for gasoline and the market for bus travel in Fort Wayne.
- b) Calculate the own-price elasticity for gasoline and the cross-price elasticity with bus travel.
- c) If gasoline stays at \$4 per gallon, do you think Americans will use more, the same, or less gasoline next May as they did this May?

8. (15 pts.) You work for 4M—Middle Mississippi Mining and Manufacturing Co. Your company produces tape (good Y). To produce this tape 4M must spend \$100 million to perfect the process of working with chemical adhesives, attaching these adhesives to cellophane, and manufacturing and packaging tape. Once this setup cost is incurred, each roll of tape can be produced at a cost of \$.20 each. Thus, $TC(Y) = \$100m + .20Y$.

Given that 4M has made the investment in developing the know-how for manufacturing tape, much of this knowledge can be applied to producing related products, such as adhesive message notes (good X). For an additional \$20 million investment, you can ramp up production of stick-up notes (not to be confused with Post-It notes, which are trademarked by the 3M Company). These stick-up notes can be produced at a cost of \$.05 per pack. Thus the total cost of producing tape and stick-up notes together is given by $TC(X,Y) = \$120m + .05X + .20Y$.

Finally, a stand-alone company that did not produce tape would have to incur an initial investment of \$50 million in order to begin producing stick-up notes from scratch. Its total cost function would be $TC(X) = \$50m + .05X$.

- a) What does the LRAC for tape look like, i.e. are there economies or diseconomies of scale? Hint: calculate the cost of producing 600 million and 1200 million rolls of tape.

- b) Does it make sense for 4M to produce both tape and stick-up notes, i.e. are there economies of scope? Hint: compute $TC(0, 600m)$, $TC(100m, 0)$, and $TC(100m, 600m)$.

9. (15 pts.) Your little sister works in Chicago making \$45,000 per year. Hearing about all that you are learning in the MBA program at UK, she contemplates quitting her job and joining next year's class. She decides to do a cost-benefit analysis and comes up with the following costs of a decision to move to Lexington for a year to pursue a UK MBA:

Tuition	\$9,000
Textbooks and supplies	\$1,000
Meals	\$4,000
Lodging	\$10,000
Purchase of a car	\$15,000
Operating costs of car (gas, maintenance, insurance, taxes, title, tags, and anything else you can think of)	\$3,000

Your sister also figures that she will have \$8,000 in incidental living expenses, so she plans to take \$50,000 out of her savings to pay for all of this. At the end of the year she expects to be able to sell the car for \$10,000, since she plans to move back to Chicago to look for a job, and only needs a car while in Lexington. Assume that the market interest rate at which she can borrow or lend is 10%. What do you think about her cost analysis? Do a point-by-point critique and come up with your own estimate of the total economic cost of her decision to get her MBA.