Solutions available Wednesday, November 6

- 1. Upon graduation from the Maxwell School, you take a job working for a non-profit charitable organization. Of course, since the organization is non-profit, maximizing profits is not the organization's goal. Instead, the organization's board of directors has decided that the organization's goal is to raise as much revenue as possible, figuring that the more revenue brought in, the more it will have to spend. To increase revenue, the organization is beginning a new advertising campaign in local newspapers. Given your experience in economics, you are asked to help the organization determine how much to spend on the advertising campaign. They provide you with the following facts:
 - Each advertisement will cost \$5,000. You need to pay this cost each time you produce an ad to place in a city (that is, if you advertise in four different cities, you need to pay \$20,000 to produce four ads). In addition, newspapers in each city charge \$0.50 for each reader of the paper.
 - The increase in donations received after placing an ad depends on the number of people the ad reaches. The organization estimates that, for each additional person an ad reaches, donations to the organization increase by \$0.75.

NOTE: In the following questions, I am considering the unit of analysis an individual ad, NOT an individual reader. The marginal benefit and marginal cost are intended to be per ad.

- a) Given the above information, what are the marginal benefits of placing an ad in a newspaper? Using the variable *R* to represent the number of readers each city newspaper, can you derive a formula to represent these marginal benefits?
- b) What are the marginal costs of placing an ad in a newspaper? Again, using the variable *R* to represent the number of readers each city newspaper, can you derive a formula to represent these marginal costs?
- c) Using the above equations, calculate the minimum number of readers that a newspaper must have for it to be worthwhile to place an ad. (*Hint*: think about what must be true about the above equations for the ad to just break even.)
- d) Consider the following data. Which cities should you place ads in? Why?

	Number of newspaper	
City	readers	
Albany	35,000	
Binghamton	21,000	
Syracuse	25,000	
Ithaca	15,000	

2. You have been hired as a consultant by Green Streets, a local environmental group. They are planning a two-day exhibition on local development issues. The exhibition will include speakers and exhibits discussing ways in which local development can be more environmentally friendly. The costs for the exhibition are given below. You have been asked to come up with pricing strategies for the exhibition. Green Streets expects 1,000 people to attend the two-day event. For simplicity, you can assume that all attendees will come to both days.

Day 1:	Use of exhibit hall space:	\$2,500
	Speaker fees:	\$1,000
	Brochures:	\$1 per person
	Luncheon:	\$15 per person
	Evening reception:	\$25 per person
Day 2:	Use of exhibit hall space:	\$2,500
	Speaker fees:	\$2,000
	Box lunch for participants:	\$10 per person
	Coffee-break service:	\$4 per person

In addition to these daily expenses, preparing the exhibits and marketing the exhibition will costs an additional \$2,000.

- a) If 1,000 attend, what are the average fixed costs per attendee?
- b) If 1,000 people attend, what are the average variable costs per attendee?
- c) What admission price must Green Streets charge for the two-day event to break even if 1,000 people attend?
- d) To increase attendance, you suggest offering a reduced rate to people who do not want to attend the reception on day 1. You estimate that this will increase attendance by 250. What is the new average fixed cost?
- e) What is the average variable cost for those people that do not attend the reception?
- f) Based on your answers above, find the prices to charge (1) the 1,000 people who will attend the entire event, including the reception, and (2) the 250 people who will take advantage of the discounted rate by not attending the reception, so that the exhibition will break even. (For simplicity, assume that 1,000 people will still choose to attend both the exhibition and reception.)
- 3. Wanda's Witchcraft Accessories (WWA) manufactures broomsticks for witches (she's been very busy lately!) The broomstick industry consists of many competitors, and they are not allowed to cast spells on potential entrants to the market, so there is freedom of entry and exit. Of course, witches know all about what the various broomstick manufacturers offer, and all broomsticks are identical. WWA has the following cost structure:

Q	ТС	MC	ATC	AVC
0	\$30			
1	\$40	\$10	\$40	\$10
2	\$55	\$15	\$27.5	\$12.5
3	\$75	\$20	\$25	\$15
4	\$100	\$25	\$25	\$17.5
5	\$140	\$40	\$28	\$22
6	\$200	\$60	\$33.33	\$28.33

- a) What are the fixed costs for the firm? How do you know this?
- b) For the following market prices, find the equilibrium quantity and profits. Be sure to explain how you arrived at your answers.

i) \$40, ii) \$25, iii) \$15, iv) \$10

c) What price is a long run equilibrium price for this industry? How do you know this?

4. In Radiator Springs, all retail properties are owned by local developers, and leased to individual proprietors on an annual basis. Currently, all the available retail properties are leased, so there are no vacancies. Moreover, due to local zoning restrictions, there is no room to build additional properties.

Luigi's Tire Shop is an example of the services provided in Radiator Springs. Currently, Luigi sells tires for \$100 per set. At this price, he is currently able to sell 100 sets of tires per month.

Currently, Radiator Springs receives few visitors, as it is located several miles from the nearest highway exit. However, state officials are considering a new exit ramp from the highway that would make it easier for visitors to reach the town. This question asks you to consider how the new ramp would benefit businesses in Radiator Springs, using Luigi's tire shop as an example. Luigi projects that, should the ramp be built, he would be able to sell 150 sets of tires per month, at a price of \$120 per set. His costs are described below:

- Each set of tires costs Luigi \$50.
- Luigi currently hires one assistant at a cost of \$3,000/month. To accommodate additional demand, if the ramp is built he will hire a second assistant, also at a cost of \$3,000/month.
- The cost of depreciation and maintenance for Luigi's equipment comes to \$1,000/month. After the ramp is built, Luigi will double the amount of equipment used, raising this cost to \$2,000/month.
- If he didn't run his own shop, Luigi could work at the local junkyard and earn \$500/month.
 - a) Except for the rent that Luigi must pay to local developers, what are the costs of selling these tires before the ramp is built? Be sure to include all costs relevant to an economist, and explain how you calculated them.
 - b) How much revenue does Luigi earn selling tires before the highway ramp is built?
 - c) What rent will the developers charge Luigi? How do you know this?
 - d) How much revenue will Luigi earn selling tires after the highway ramp is built?
 - e) Except for the rent on his shop, how do the costs of selling tires change after the ramp is built? Calculate the new total costs, excluding rent.
 - f) What rent will developers charge Luigi once the highway ramp is built? In the long run, who benefits from the additional traffic that the ramp brings to town? Why?
- **5.** This question asks you to consider the market for solar panels produced in China. For this question, please assume that there are many small solar panel manufacturers in China, so that the market is perfectly competitive.
 - a) Begin by depicting the market for solar panels in long-run equilibrium. Using two diagrams, one to represent the market for solar panels, and a second to represent the costs of a typical solar panel manufacturer, illustrate the current price, quantity and profits of a typical solar panel manufacturer. Explain why you have drawn the curves as you did.

(question continued on next page)

b) In an effort to support the development of alternative energy, the Chinese government decides to subsidize the production of solar panels. For example, the government can provide land for solar panel factories below market prices, thus lowering the cost of setting up a factory.

Reproduce your diagram from part (a) below. Then, show how subsidizing a factory in this way changes the analysis from part (a) in the short-run. How would the short-run profits of a typical solar panel producer in China change?

- c) Will the scenario you have described in part (b) be a stable long-run equilibrium? Why or why not? Once again using separate diagrams for both the industry and a typical firm, illustrate the new long-run equilibrium for the solar panel market in China. Be sure to show any changes between your answer here and your answer in part (b).
- d) China is a dominant player in the global solar panel market, producing approximately 60% of all solar panels. Moreover, their market is almost entirely international. 95% of the solar panels produced in China are exported to other countries. Given China's large market share, how would the subsidies described earlier affect solar panel producers in the United States, who produce less than 5% of the world's solar panels? (A graph isn't necessary here. A written explanation is sufficient.)
- **6.** To reduce travel time between San Francisco and Los Angeles, the state of California has built a Hyperloop transport system, allowing riders to complete the journey between these cities in just 35 minutes. They must now decide what price to charge riders. After some careful research, you estimate the following demand curve for Hyperloop rides:

P = 8,500 - 2Q

where Q represents the number of riders per month. The marginal costs of a ride are \$400. The fixed costs of running the Hyperloop come to \$1,500,000 per month. Three commissioners of the California Hyperloop Intercity Transport System are debating pricing strategies.

- a) Because the Hyperloop is a one-of-a-kind transportation system, the state of California can act like a monopolist when setting prices. Commissioner Kirk argues that acting as a monopolist and maximizing profits from the Hyperloop system will bring in needed revenue to the state. Find the number of rides per month, along with the price per ride, if the state maximizes profits as a monopolist. Illustrate on a graph.
- b) How much profit does the city make if it acts as a monopoly?
- c) Commissioner Janeway believes that the state is providing a vital public service, and so should provide access to the Hyperloop without any deadweight loss. To completely eliminate the deadweight loss, what should the price of a ride be? How many rides will commuters take at that price? Will the state make money, break even, or lose money at that price? Explain.
- d) Redraw your graph from part (a). On it, please show the consumer and producer surplus that result from the monopoly pricing strategy. Compare this result to the consumer and producer surplus associated with Commissioner Janeway's pricing strategy. What does the difference represent?
- e) Commissioner Picard is not happy with either plan. He does not like the deadweight loss and large profit from monopoly pricing, but is also not happy with the outcome of part (d). Can you suggest a compromise pricing strategy that could reconcile these concerns? (Note: you do not need to calculate any numbers here. Just give a general explanation of an alternative pricing strategy that could work.)