

All Homework Questions, Econ 2302, Darren Grant.

This course has a total of six homework sets, each of which has six questions, which each have multiple parts. Please complete all parts of all questions on a separate sheet of paper; you are invited to turn this in to me in class on the assigned day. Multiple pages must be *stapled* together. Please note: no late work is accepted, even if you are just late to class. You are always welcome to turn in a hard copy of your work *early*, by sliding it under my office door. However, I do not accept work that is e-mailed.

You are welcome to work on the homework with classmates, but you should still turn in your own work. Copying from others is not turning in your own work. This is wrong and is prohibited.

We will go over the answers together in class. Please be prepared to contribute to the discussion!

Finally, our course Blackboard site has a “preview” video for each homework, in which I work out two problems entirely, which you can use to help you work out the problems or to see the answers later. We usually do not go through the problems that are featured on these videos in class. After the homework is due, a “review” video will appear on Blackboard that works the remaining problems. Please note: I occasionally alter the questions slightly, so be attentive to this!

### ***Homework 1***

1. For each situation, illustrate the effect of the “event” on price and quantity in the market specified, using a supply/demand graph.

- A) An decrease in income, on the market for gold.
- B) A cost-saving technology improvement, on the market for computers.
- C) A flood (of water), on the market for wheat.
- D) Summer (vacation time), on the market for gasoline.

2. For each situation, illustrate the effect of the “event” on price and quantity in the market specified, using a supply/demand graph.

- A) An increase in the price of electricity, on the market for steel.
- B) An increase in the price of mustard, on the market for grocery store hot dogs.
- C) An economic expansion, in the housing market.
- D) An increase in the minimum wage, in the market for fast-food.

3. True or False? Explain your answer. In particular, if it is false, be sure to explain why.

- A) In perfectly competitive markets, firms choose how much they will produce based on how much they think people will want to buy.
- B) When prices go up, that must mean that people are buying more.

C) A market can be perfectly competitive even if government places restrictions on it, such as a requirement that workers get paid extra for working overtime.

D) The perfectly competitive market always seeks the price that equates the amount supplied with the amount demanded, even if a higher price would give firms higher profits.

4. (Case and Fair, modified) The U.S. government administers two programs that affect the market for cigarettes. Media campaigns and labeling requirements are aimed at making the public aware of the health dangers of cigarettes. Meanwhile, the Department of Agriculture maintains a program which limits the amount of land that can be devoted to growing tobacco.

A) On a single supply/demand graph, illustrate the effect of these two programs on cigarette consumption. Are they at odds with respect to the goal of reducing cigarette consumption?

B) The cigarette market is not, in reality, a perfectly competitive market. Explain why.

5. (Mankiw, modified) Illustrate how each of the following events affect price and quantity in the market for minivans, using supply/demand graphs.

A) There is a baby boom.

B) Steel prices increase.

C) The price of SUVs rises.

D) Stock-market gains increase people's wealth.

E) The minivan market cannot really be considered perfectly competitive market. Explain why.

6. This problem modifies our ticket example ever so slightly, but the underlying principle remains the same. Two friends, living on the same floor of their dorm, win general admission tickets to "Grantatonix," which is coming in concert. Each would sell their ticket at the right price. Jenny would sell at a price of \$10 or higher, and Levi for \$20 or more. Three other residents on this floor of the dorm didn't win tickets but are interested in attending the concert. Exi would buy a ticket for \$15 or less, Numbers for \$25 or less, and Duty for \$30 or less.

A) Who ends up selling their ticket, who ends up buying a ticket, and approximately what is the selling price (in dollars)? Explain how you determined your answers. (Note that you do not have to say who sells to whom, only who is a seller and who is a buyer.)

B) The selling price in part A cannot be \$13. Explain why.

C) Draw a demand curve for this "market," using the information above. Put a point for each relevant person on the demand curve, and label it with the first letter of their name. Then do the same thing for supply, on a separate graph.

D) Of the five people in this market, only one does not end up receiving any gains from trade whatsoever. Who is it? Why don't they get any gains from trade?

## Homework 2

1. Answer the following questions using the information in the table below.

A) The demand curve assumes that all else, such as income, is being held constant. Draw the demand curve for an income of \$50,000, and locate points A and C on the curve.

B) The demand curve shifts when income increases to \$60,000. Draw the new curve and identify points B and D on the graph. Are sunglasses a normal good or an inferior good? Explain.

C) What is the elasticity of demand between points B and D? Calculate the elasticity numerically, and show your work. Is Maverick's demand for sunglasses price elastic or price inelastic? Explain.

Maverick's Demand for Sunglasses			
Point	Price	Income	Quantity Demanded
A	\$200	\$50,000	4
B	\$200	\$60,000	6
C	\$300	\$50,000	3
D	\$300	\$60,000	5

2. The city decides to raise the amount it charges residents for water (\$/thousand gallons) by 10%. They expected that revenues would also increase by 10%, but they only increased by about 5% instead.

A) What was the city assuming about demand, when it expected revenues to increase by 10%?

B) Is the demand for water elastic or inelastic? First, answer using your intuition, and explain that intuition. Then answer by using the "arrow method" to analyze the change in revenue. The two answers should match!

C) What about the waterworks' total costs: will they increase, decrease, or remain unchanged? What about its *profit*: will it fall, increase by less than 5%, or increase by more than 5%? Explain.

3. Fir and spruce are two softwoods that are used for basically the same kinds of things--building furniture, Christmas trees, etc. Both are sold in competitive markets. A beetle infestation wipes out a lot of fir trees but leaves the spruce untouched.

A) Draw two supply/demand graphs to demonstrate how this would affect the prices and quantities sold of spruce and fir over the next few months.

B) Would the change in fir prices be greater if demand was elastic, or if it was inelastic? Explain.

C) Would you expect the demand for fir to be elastic or inelastic? Why?

4. (Mankiw, modified) Consider the federal minimum wage law, discussed at length in the textbook, which sets a minimum wage that is above the equilibrium wage in the market for unskilled labor.

A) Using a supply/demand diagram, show the equilibrium wage, the minimum wage, the number of workers who are employed at the minimum wage, and the number of workers who are unemployed at the minimum wage.

B) Compared to equilibrium, what effect does the minimum wage have on *employment*? Is the change in employment greater when labor demand is elastic or inelastic? Explain your answer.

C) Compared to equilibrium, what effect does the minimum wage on *unemployment*? Does the change in unemployment depend on the elasticity of demand, the elasticity of supply, or both elasticities? Explain your answer.

5. Use the following information to answer these questions. Columns One and Two contain quantities (in arbitrary units).

Price	Column One	Column Two
\$9	11	15
\$8	12	14
\$7	13	13
\$6	14	12
\$5	15	11
\$4	16	10

A) Which column gives the demand relationship, and which gives the supply relationship? Explain.

B) What is the equilibrium price? Explain.

C) A price \_\_\_\_\_ (floor, ceiling) set at a price of \$\_\_\_\_\_ will lead to a surplus of 2 units.

D) Calculate the total revenue at the price in B) and at the price in C). For which price is revenue larger? What does your answer tell you about the elasticity of demand? Explain.

6. There are 5,000 parking spaces on SHSU's campus. Demand for parking spaces is higher during the day, when the lots are full, than at night, when you couldn't fill up the parking lots if you wanted to. Day parking privileges are granted by buying a sticker, which costs \$50 per semester; anyone can park at night.

A) On a single graph, draw two demand curves for parking, one for daytime, one for night. Identify on your graph the number of parking spots on campus and the \$50 price. Make sure your graph is consistent with the facts above, that the parking lots are full (but not overflowing) during the day, but could never be filled up at night.

B) If the price of parking stickers went down to say, \$20 per semester instead of \$50, what would it be likely out in the parking lots during the day; that is, what would be the consequences? Explain in words, and illustrate on the graph you have drawn.

C) The university wants to increase revenue by raising the price of parking stickers to \$60. Under what circumstances would that plan succeed, and when would it fail? Would you expect circumstances to be favorable or not? Why?

### Homework 3

1. “Jordan and Friends” do Face Painting at the County Fair. It takes 10 minutes to paint a child’s face and labor costs \$12/hr. (The cost of the paint is trivial and can be ignored.) The kids are lined up for Face Painting when the fair opens at 8 a.m. If they run out of kids to paint before the closing time of 6 p.m., workers are sent home early. Only four workers & chairs can fit in the booth. Booth rental and setup costs a total of \$500.

- A) Would labor be considered a fixed cost or a variable cost? What about booth rental? Explain.
- B) Draw out my “Model of a Firm,” and label each component of the model with its real-world counterpart for Jordan and Friends.
- C) At capacity, how many faces do Jordan and Friends paint in a day? What are their total costs? Show your work.
- D) Write out the right-angle model for Jordan and Friends. Numerically identify capacity, marginal cost, and the average total cost at capacity.

2. Robicheaux’s Green Acres is a fine family-owned and operated hotel located in the bayous of Louisiana. With one exception (see part A), the weekly costs of running the hotel are as follows:

Utilities: \$1000	Wages (for the maids): \$4000	Depreciation
Insurance: \$1000	Value of the Family’s Time: \$2000	and Maintenance: \$500

During a typical week the hotel serves 200 guests (rooms) at a price of \$50 per room.

- A) I left out one major economic (opportunity) cost, that is not an accounting cost. What is it?
- B) Calculate your *accounting* profit. Show your work.

Average total cost is \$45 per room, while marginal cost is \$35 per room.

- C) A new guest walks in, and asks for a room. How much does it cost the Robicheaux Family to provide that guest a room for a night: \$50, \$45, or \$35? Choose one answer and briefly explain.
- D) Which of the costs listed above are not included (at all) in marginal costs? Explain.

3. The Americans with Disabilities Act (ADA) requires public establishments to be accessible to the disabled. This requires the construction of concrete entrance ramps and other building improvements.

- A) Are these building improvements fixed or variable costs? Explain. Do they change the firm’s capacity? Explain.
- B) Draw out a standard set of cost curves for a typical firm, and label each curve.
- C) How does the ADA affect the firm’s MC curve? Show any changes on the graph.
- D) How does it affect the firm’s ATC curve? Draw or show any changes on the graph.

4. The Law of Diminishing Returns applies to each of the following situations. Explain how. To do so, first identify in each case the “output,” the “variable input,” and the “fixed factor” in each case. Then, in each case, explain what it means to experience diminishing returns.

- A) Trying to grow more soybeans by fertilizing more.
- B) Scraping old paint off a wall.
- C) Adding people to your team in tug-o-war.

5. Some Facts and Figures for “Blue Jean’s Auto Shop” are shown below. (Each is for a year period.) Jean could earn \$25,000 painting houses if she didn’t work in her auto shop.

Revenues:	\$80,000	Jean’s initial investment:	\$100,000
Rent:	\$7,000	The interest rate:	6%
Car Parts:	\$15,000	Depreciation on machinery:	\$24,000

- A) Draw out my “Model of a Firm,” and label each element as it applies to Blue Jean’s Auto Shop. Which costs are fixed and which are variable?
- B) What are Jean’s accounting costs, and accounting profit? Show your work.
- C) What are her economic costs, and economic profit? Show your work.
- D) Based on your answers to the previous questions, will Blue Jean want to continue in the auto repair business, or is she looking to get out of this market? Explain.

6. The following table pertains to a typical firm in a perfectly competitive market. The final product sells for a price of \$18 per unit.

Output	Total Cost	Marginal Cost	Average Total Cost	Total Revenue
0	10	---	---	----
1	19			
2	28			
3			13	
4	56			
5	77			
6	102			

- A) Fill in all of the empty cells in the table.
- B) If the numbers in this table were drawn out on a graph, would the MC curve take the usual shape? What about the ATC curve? How do you know?
- C) In this table, which output level maximizes *revenue*? Does this same output maximize *profit*? Explain.

#### Homework 4

1. Fluffy-Gro, Inc., grows cotton and sells it in a perfectly competitive market. Fluffy Gro worker Ima Doltt drives a new tractor into the Wetlands adjoining the property; a new replacement tractor is purchased the next day for \$40,000.

- A) Is replacing this tractor a fixed cost, a variable cost, or both? Explain.
- B) How is Fluffy-Gro's MC curve (for this season) changed? If so, how?
- C) Does Fluffy-Gro respond to the tractor incident by raising the price of its cotton? Explain.
- D) Does Fluffy-Gro respond to the tractor incident by changing the quantity it produces? If so, how?
- E) Why does Fluffy-Gro produce the quantity it does?
  - 1) It costs too much to produce any more.
  - 2) It can't find buyers for any more cotton.
  - 3) It doesn't want to lower its price to attract more buyers.

2. (Mankiw, modified) The fertilizer market is perfectly competitive. Firms in the market are currently operating, though they are earning a negative economic profit.

- A) How does the price of fertilizer compare to the average total cost of making fertilizer?
- B) Draw two graphs, side by side, illustrating the situation for the typical firm and for the market. The price axes on these two graphs should be on the same scale.
- C) If there is no change in demand or costs going forward, what will happen over time to the price of fertilizer? Illustrate on the supply/demand graph you already drew for part B.
- D) Now how does the price of fertilizer compare to the average total cost of making fertilizer?

3. Calvin's Barber Shop is a barber shop. It costs Calvin, in terms of time and electricity, \$25 for each hour his shop is open. Calvin has breakfast at 6 a.m. and must be home for dinner at 6 pm, thus, the only hours he can work are 7 am – 5:59 pm. His hourly revenues depend on the time of day, as shown in the table below. The shop is busier during the peak of day than in early morning or in the evening.

TIME	7 am	8 am	9 am	10 am	11 am	12:00	1 pm	2 pm	3 pm	4 pm	5 pm
REVENUES	\$15	\$21	\$33	\$45	\$50	\$45	\$40	\$30	\$23	\$15	\$10

- A) Would you say Calvin's costs fit the right-angle model? Why or why not?
- B) Should Calvin work from 7 am – 5:59 pm? If not, what hours should his Barber Shop be open? Explain your answer.
- C) Calvin's rent is \$100 per day. Assuming that Calvin is only open for those hours you identified in part B, calculate his revenue, economic costs, and economic profit. Show your work.
- D) When Calvin's lease expires, will he renew it? Why or why not?

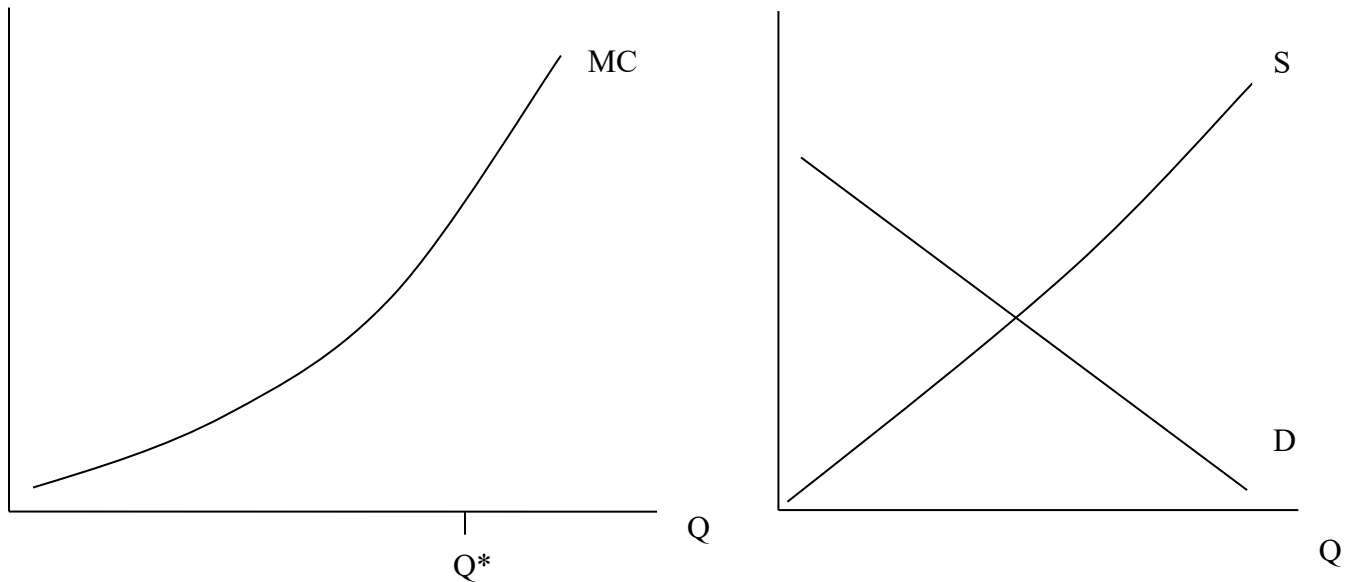
4. Texas grows lots of citrus. Two graphs are drawn below. The one on the right contains the demand and short-run supply curves for the orange juice industry, assumed for this problem to be a perfectly competitive industry. The other contains the marginal cost curve for a typical firm in the orange juice industry. Currently, firms have no incentive to enter or leave the orange juice industry. (The price axes on the two graphs are on the same scale. The quantity axes are not, but that doesn't affect the problem.)

The curves you draw to answer the questions below should be as accurate as possible, and should be such that the two graphs are logically consistent with each other, when drawn side-by-side.

A) Draw in the average total cost curve for the firm.

B) Ellen DeGeneres begins advertising Texas Orange Juice on her TV show. Shortly afterwards we notice that the orange juice firm is producing at point  $Q^*$ . What has happened to the demand for orange juice? Draw in the new curve.

C) If demand remains at this new, higher level, then what will happen to the price of orange juice over the ensuing months and years? Illustrate on the graph.



5. (Case and Fair, modified) One way to increase the amount of housing available to low-income households is for the government to build it (public housing) and rent it out at market rates. An alternative is to provide households with vouchers that can be used like cash to rent housing supplied by private-sector landlords (this is called "Housing Choice Vouchers").

A) Illustrate the effect of each policy on the price and quantity of housing in the *short run*, using (separate) supply/demand curves.

B) In which case are private landlords better off? In which case are they worse off?



C) In the *long run* private landlords will enter profitable markets. Under which alternative (vouchers, public housing) is this more likely to occur? On a separate supply/demand graph, illustrate the effect of entry on the price and quantity of rental housing in the long run.

6. The cost curves for Chopin's Bedpans are given below. The market price of bedpans is \$10.

A)  $Q_C = 500$  bedpans. What are the firm's total revenues, total costs, and total profits at  $Q_C$ ? Show your work.

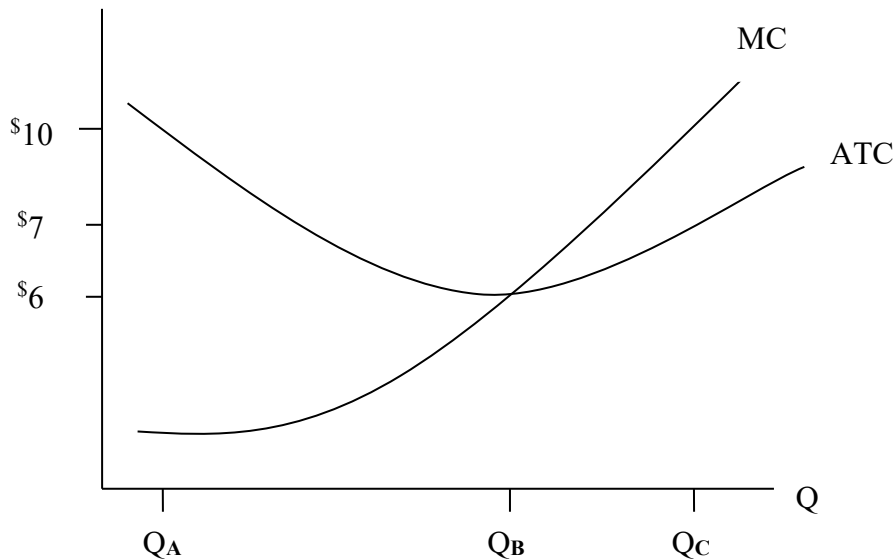
B)  $Q_B = 350$ . What are the firm's total revenues, total costs, and total profits at  $Q_B$ ? Show your work.

C) At the current price of \$10, does the firm make positive, zero, or negative economic profit at  $Q_A$ ?

D) On the graph, which quantity maximizes profits:  $Q_A$ ,  $Q_B$ , or  $Q_C$ ? Comparing your answer to parts A-C, is the profit maximizing quantity on the graph also the profit maximizing quantity numerically?

E) Over time, will this market experience entry, exit, or neither? What will be the price in long run equilibrium? Explain.

F) How many bedpans (what quantity) will the firm produce in the long run?



### Homework 5

1. In the hothouse working late one evening, Dr. Ima Masing discovers, to her surprise, the secret to growing the Bonsai Loblolly Pine Tree, which had eluded botanists for years. Dr. Masing can produce 10 Bonsai Pines in one hothouse in one year. Each hothouse costs her \$2000 per year, and the cost of the labor, water, and fertilizer is \$600 per tree.

A) Currently, what type of market is the Bonsai Pine industry? Explain.

B) Currently, Dr. Masing maximizes her profit by selling 50 trees per year at a price of \$1000 each. What is her (yearly) profit? Show your work.

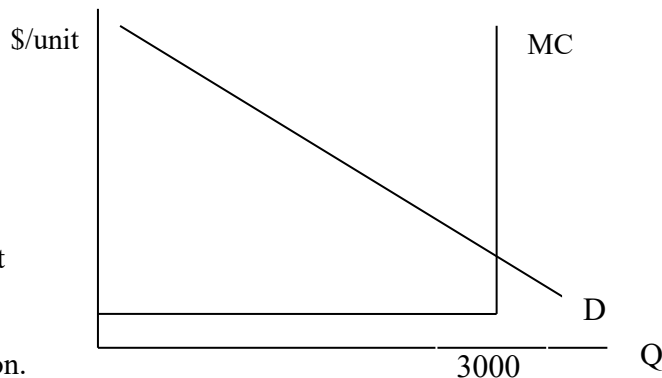
- C) Why doesn't Dr. Masing produce 60 trees?
- 1) The additional trees would be especially expensive to produce.
  - 2) She can't find buyers for any more trees.
  - 3) She doesn't want to lower her price to attract more buyers.

Then, suddenly, Dr. Masing's lab assistant, Eamon Trustworthy, posts her Bonsai Pine growing secret on the Internet for all to read. Now anyone can grow a Bonsai Pine tree.

- D) What type of market is the industry now? Explain.
- E) What will the price (in \$) of Bonsai trees be in the long run? Explain your answer.

2. The demand curve and MC curve for Ft. Worth Cats games is shown below. The baseball stadium has 3,000 seats. The Cats play one game each week, and they keep all gate receipts.

- A) Why is the MC curve so low?
- B) At what price does the stadium sell out? Label it on the graph.
- C) What price should the Cats charge? Illustrate on the graph. Do the Cats sell out the stadium or not?



- D) The Cats disbanded after the 2014 season. What does that tell you about their average costs? Draw in ATC in an appropriate place on the graph.

3. The Bonsai is a miniature tree that takes skill and patience to grow. The cost of the seed, water, time, etc. to grow a Bonsai is \$100 (and fixed costs are low enough to be ignored). There are 11 people in Huntsville who are willing to buy the Bonsai tree for a price of \$650 or less (but no more than \$650). Everyone else in Huntsville does not want a Bonsai tree at any price.

- A) If Bonsai trees were sold in a perfectly competitive market, what would the price be (in the long run)? Why?
- B) If Bonsai trees were sold by a single store in the area, what would their price be? What would the store's profit be? Show your work.

Now let there be a 12<sup>th</sup> person in town who is willing to buy a Bonsai tree for a price of \$600 or less. Only one store in town sells Bonsai trees. The store doesn't know who is willing to pay only \$600; it just knows there are 11 people who would pay \$650 and one who would pay \$600.

- C) What is the marginal revenue from selling the 12<sup>th</sup> tree? Show your work. What price will the store charge for Bonsai trees? Explain.

4. Until 2005, India's patent policy essentially allowed anyone to produce any pharmaceutical drug, whether it was under patent in another country or not. After 2005, however, India changed its policy to respect foreign patents that give developers of new pharmaceutical drugs the right to be the sole seller of that drug for a period of several years.

- A) Before 2005, what type of market was the market for pharmaceuticals in India?
- B) Draw a graph containing a marginal cost and average total cost curve for a producer of a pharmaceutical drug. Identify the price in long run equilibrium in the Indian market.
- C) After 2005, what type of market is it for a drug that is under patent?
- D) Copy over the cost curves in part B onto a new graph, and add demand and marginal revenue curves to it, such that the demand curve is mostly above ATC. Identify the price of pharmaceuticals now.
- E) In 2003, Indian companies were selling the leukemia drug Gleevec for \$2,700 per year (enough doses for an individual to take for a year). After India changed its patent policy, the patent-holder alone sold the drug and charged, instead, \$27,000 per year. On the graphs you drew, where would the \$2,700 and \$27,000 go?

5. For each of the following markets, indicate which of the following characteristics it has, if any: barriers to entry, product heterogeneity, or concentration. (That is, list any and all of these that apply). Then indicate whether the market is perfectly competitive, a monopoly, or something else.

- A) Domestic airline travel out of IAH.
- B) Auto repair in Houston.
- C) Auto towing in Houston.
- D) Domestic train travel.

6. The following table provides the demand information for Leafy Green Tea. The marginal cost of producing each box of tea is \$25, while the firm has fixed costs of \$50.

Units	Price	Revenue	Marg. Rev.	Total Cost
1	\$100			
2	\$80			
3	\$60			
4	\$40			
5	\$20			

- A) Fill out the table above.
- B) If the firm's goal is to maximize its revenue, how much should it produce? Why?
- C) If the firm's goal is to maximize its profit, how much should it produce? Why?
- D) If the firm's goal is to produce as much as possible without losing money, how much should it produce? Why?

## Homework 6

1. My friend says, "The restaurant industry is not a perfectly competitive industry, so restaurants have the ability to set their own prices. As a result, they will earn positive economic profits in the long run."

A) Does this industry exhibit a lot of concentration? Is its product homogenous or heterogeneous? Are there barriers to entry? Overall, what is the market structure of the restaurant industry?

B) Do restaurants have the power to set their own prices? If they can, what gives them that power?

C) Does the typical restaurant earn an economic profit in the long run? If not, why not?

2. It costs more for a woman's haircut than a man's haircut, even in salons which offer both men's and women's cuts.

A) If the haircutting market was perfectly competitive, and in long-run equilibrium, then what *must* explain the difference in the price of haircuts?

B) If the haircutting market was not perfectly competitive, then differences in "product heterogeneity" could also explain the difference in the price of men's and women's haircuts. Explain how.

C) Illustrate the point in part B) graphically. Draw two price setting graphs for haircuts, one for men, one for women. Put identical marginal cost curves on these graphs, but let there be different degrees of product heterogeneity. Identify the profit maximizing price in both graphs and compare them.

D) Is the haircutting market perfect competitive or monopolistically competitive? Why?

3. A university is considering auctioning licenses that would allow vendors to sell canned soft drinks on campus. It is trying to decide between having one vendor or two vendors.

A) In which situation, one vendor or two, is the market more concentrated?

B) If the university allows two vendors, will the price be higher or lower than if it had one vendor? What about the quantity? Explain.

C) If the university sells licenses to two vendors, will it receive more in total license fees than if it sells a license to only one vendor? Explain.

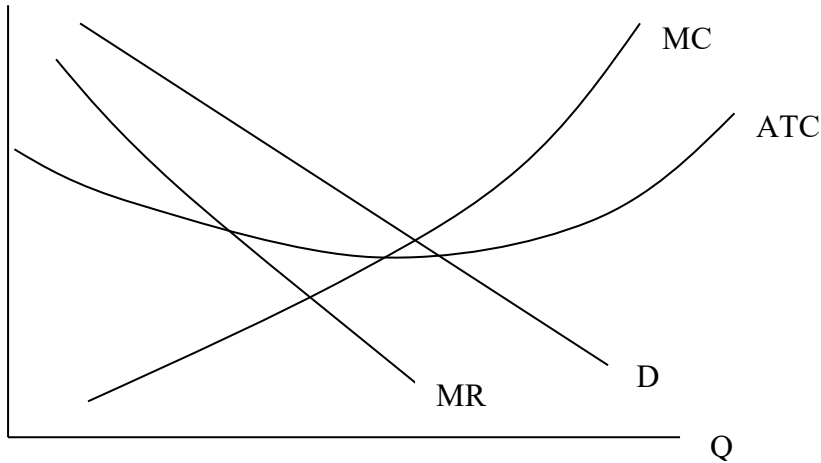
D) Will students be better off if the university licenses one vendor or two? Explain.

4. Five behaviors that are sometimes observed in markets are the following:

- Firms cannot choose their price
- Price exceeds marginal cost
- Firms would generally like to have more customers
- In the long run, firms produce the amount that minimizes ATC
- Barriers to entry make it difficult for new firms to enter the market

A) Which of these behaviors would typically be observed in a monopoly? List all that apply.

- B) Which of these behaviors would typically be observed in a perfectly competitive market?
- C) Which of these behaviors would typically be observed in monopolistic competition?
5. A cost-curve graph is given below for a typical firm in a monopolistically competitive industry.



- A) Identify the profit maximizing quantity and price on the graph; label them Q1 and P1.
- B) Is this firm currently making economic profit? How do you know?
- C) This market is not in long run equilibrium. Why not?
- D) If the market were perfectly competitive (it's not), then what price would prevail in the long run? Label this P2.
- E) Which price will prevail in the long run in this market: P1, P2, or a price between P1 and P2?
6. The table below relates market events to price, quantity, and profits. Fill in the blank cells.

<i>Market Event</i>	<i>Effect on Price</i>	<i>Effect on Quantity</i>	<i>Effect on Profit</i>
exit from the market			
consumers' brand preferences become stronger		xxxxxx	xxxxxx
costs increase			
an increase in concentration			
	increase	increase	increase

**The Cost of Driving Assignment.** You can work this assignment, applied to your own car, as an engagement activity for the Unit in which it is assigned. To receive credit, you must type your work, show all calculations, and append copies of the vehicle appraisals requested below, and most of your answers must be correct.

In this problem we will estimate the economic costs of driving for your car (if possible). Two websites, **edmunds.com** and **kbb.com**, each contain used car appraisers that give the trade-in value of most used cars. (Edmunds requires your license plate number; Kelley Blue Book does not. You can use either one.) Pick a car, yours if possible, that is included in the used car appraiser and is not the first year of the model.

At the top of the page, type your vehicle make and year, its total mileage and annual mileage, and all of the following: annual insurance cost, gas mileage, typical annual maintenance costs for a car your age and type, the current price of the gas that you put in your car, the trade-in value of your car, the value of the same car one year older with the same mileage, and the value of the same car one year older with an additional year's mileage. These last three come from the vehicle appraiser. Then, using this information, complete the following.

- A) Calculate the per mile cost of gas.
- B) Calculate the per mile maintenance cost.
- C) Calculate the average cost per mile of insurance.
- D) Calculate the “opportunity cost of capital,” that is, the annual interest paid (or foregone) on the money you have *currently* invested in the car. You can look up or make up the interest rate, so long as it is reasonable.
- E) Calculate the average interest cost per mile.
- F) Calculate *total* depreciation on the car as the difference between the retail value of the car and the value of the same car one year older with an extra year's mileage.
- G) Calculate *age* depreciation as the difference between the value of the car and the value of the same car one year older with the same mileage.
- H) Calculate *use* depreciation as the difference between total depreciation and age depreciation.
- I) Calculate the *average* depreciation cost per mile.
- J) Calculate the *marginal* depreciation cost—the amount the car depreciates for each mile it is driven.
- K) Classify each of the following costs as either fixed or variable: gas, maintenance, insurance, interest, age depreciation, and use depreciation.
- L) Calculate the average costs of driving the car, per mile. Use (some of) your results in a)-j).
- M) Calculate the marginal costs of driving the car, per mile. Use (some of) your results in a)-j).
- N) The State of Texas reimburses mileage for private cars driven on state business at 60¢ per mile. If no one else needed to use your car, and you needed to travel on state business, should you drive your own car or take a state car of the same level of quality, safety, and comfort? What if the reimbursement rate was 25¢ per mile?
- O) An analog here to “increasing output with existing capacity” would be driving faster. We know that the law of diminishing returns applies whenever a firm tries to increase output by using more of a variable input with its existing capacity. In the current situation, what is the fixed factor? The variable input? The output? How does driving faster exhibit diminishing returns?