

# KEY

ECO 610 Final Exam  
Fall 2018

100 points total. Point values for each question are as indicated. 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.

- 8
1. (8 pts.) Explain the four different models of market structure that we have studied in the second half of this semester. Briefly describe the defining characteristics of each.

## 1. Perfect Competition

- Many Sellers
- many Buyers
- Homogeneous product
- No barriers to entry

## 2. Monopolistic Competition

- Many Sellers
- Many Buyers
- Differentiated Product
- Low Barriers to entry

## 3. Oligopoly

- Few Sellers
- Many Buyers
- Homogeneous or Differentiated product
- High barriers to entry

## 4. Monopoly

- 1 seller
- many of few Buyers
- Homogeneous or differentiated product
- Extremely High barriers to entry i.e., patents

2. (8 pts.) What are the different sources of barriers to entry, and give an example of each.

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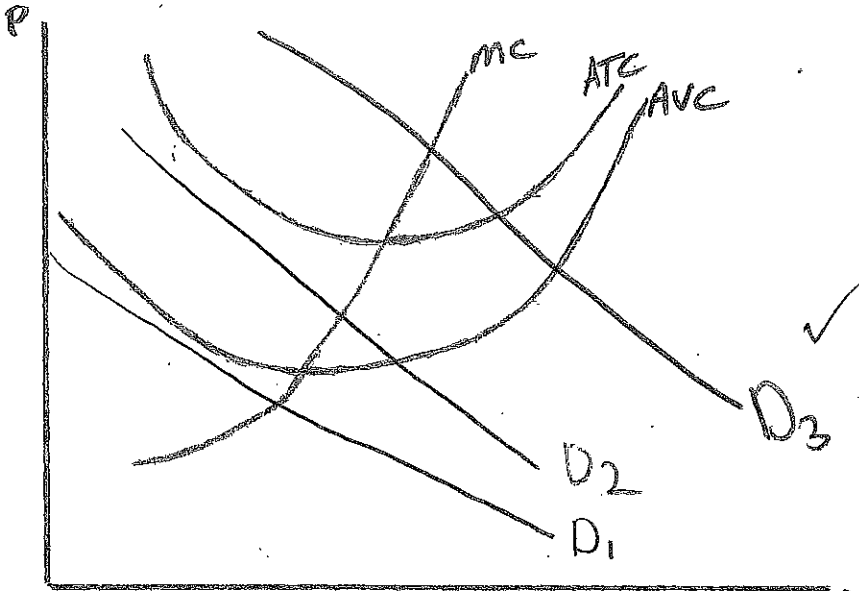
- ✓ ① Control / ownership of raw material  
ex. cobalt mine
- ✓ ② Economies of Scale: ex. car manufacturing  
(cheaper per unit to produce many rather than few)
- ✓ ③ Legal / Regulatory barriers ex. city limiting # of moving companies or hospitals in a geographic area
- + ✓ ④ Incumbent reactions, where relevant  
ex.: Does incumbent have scale to cut price to keep entrants out?

3. (6 pts.) Explain how Donald Washkewicz caused the market value of Parker Hannifan to increase its share price by 88% from 2001 to 2007.

6

✓ Mr. Washkewicz changed their pricing from a cost plus percentage across the board to a pricing model based on inverse elasticity of demand. P-H. buyers of highly specialized parts (like O-rings for space shuttles) place a higher value and are less sensitive to changes in price (inelastic) - they are now paying more to P-H is much more profitable.

4. (9 pts.) Shown below are the AVC, ATC, and MC curves for one of several miniature golf courses in a large beach resort. Illustrate and label demand curves consistent with each of the following situations. Briefly explain your answers:
- $D_1$ : It is wintertime and when we drive by the golf course, a sign says "closed for the season."
  - $D_2$ : It is springtime and the golf course is open. The owner tells us that she couldn't survive if business were like this all year round.
  - $D_3$ : It is the peak of the season, the parking lot is full, and the owner has a smile on her face.



$D_1$ : If they stayed open, revenue would not exceed costs, so they choose to shut down.

$D_2$ : They stay open to reduce their economic losses as revenue is covering variable costs. They couldn't do this all year bc they also have fixed costs.

$D_3$ : The owner is happy bc she is earning above normal economic profit by covering total costs.

5. (6 pts.) Some questions about price discrimination and whether firms in different situations are or are not able to price discriminate:

(a) Why are Raywood Stelly and Skeet Rogers not able to charge different prices to different customers for their alligator skins?

6 Demand curve is not downward sloping. There are other firms selling identical alligators, therefore firms are price takers.

(b) Bars frequently charge a different cover charge to women than men. Why don't they charge different prices for a glass of beer to women vs. men?

7 I think it'd be hard to segment the market. Men could buy for the women and vice versa.

6. (20 pts.) Oak, maple, and other hardwood trees are grown and harvested in the eastern United States. The lumber from these trees is used to make furniture, cabinets, flooring, and other products. Much of it is used domestically, but a very sizable portion is also exported to other countries. There are many small and medium-sized companies that supply hardwood, with some of the trees being grown on privately owned land and the rest being harvested from national forests. The U.S. Forestry Service keeps track of harvest sizes and also market prices. There is a specific component of the U.S. Producer Price Index devoted to oak and maple hardwood flooring. At this point you should have formed an opinion about what sort of market structure model best fits the market for eastern hardwood lumber. Now for the questions.

- (a) In the late 1990's and early 2000's, the U.S. Producer Price Index (PPI) for oak and maple hardwood flooring hovered around 170, some years being a little bit above and other years being a little bit below. The annual harvest size was in the 10-12 billion board feet range. Assume for purposes of answering this question that the market was in long-run equilibrium during this period. Briefly explain below and illustrate in the diagrams on the following page what that means. You should explain and illustrate how market equilibrium is established. You should also explain and illustrate the economic profit situation of a typical hardwood producer. To assist in your answer I have illustrated the cost curves of a typical firm. Denote your answers with (a).

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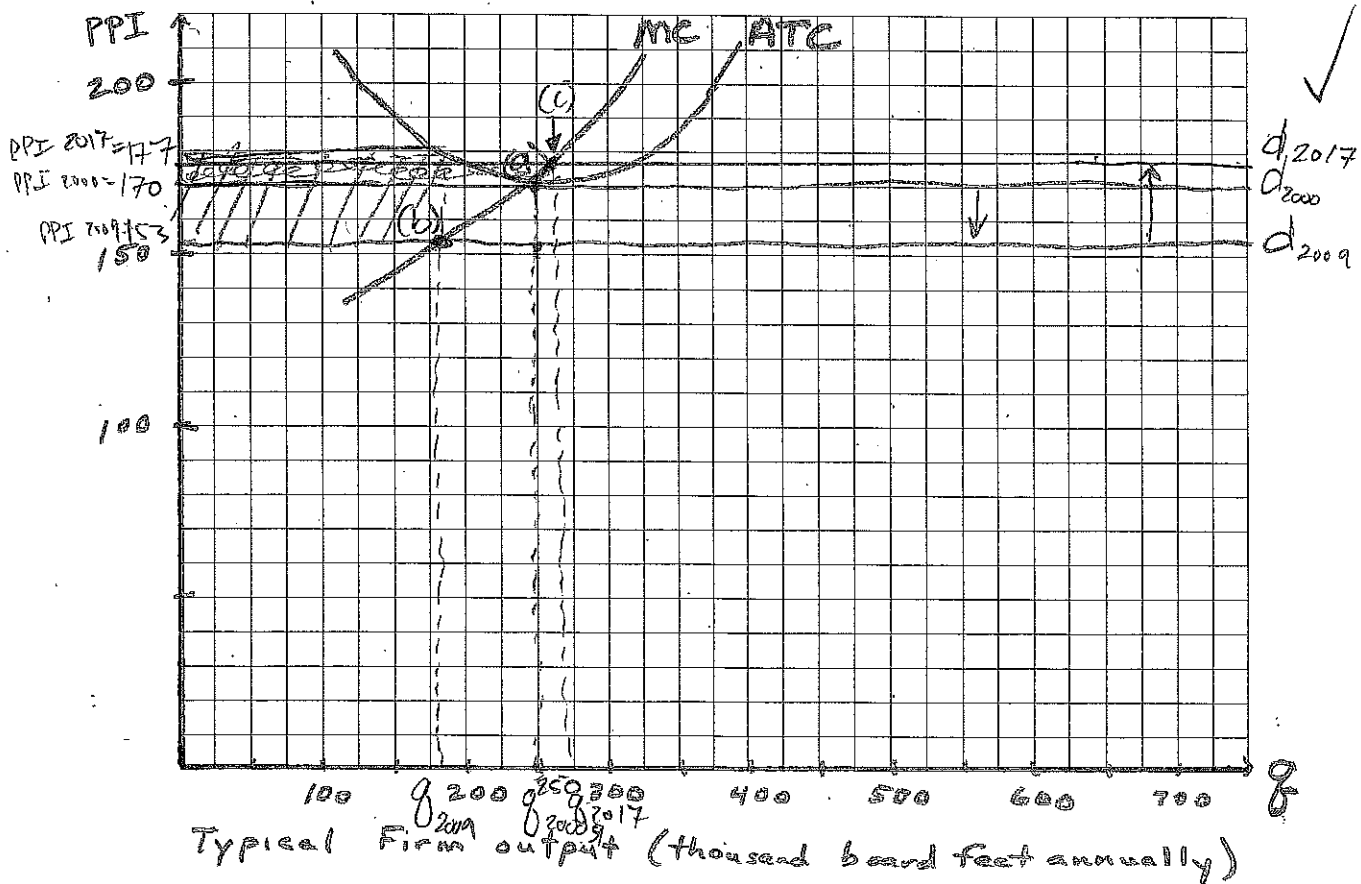
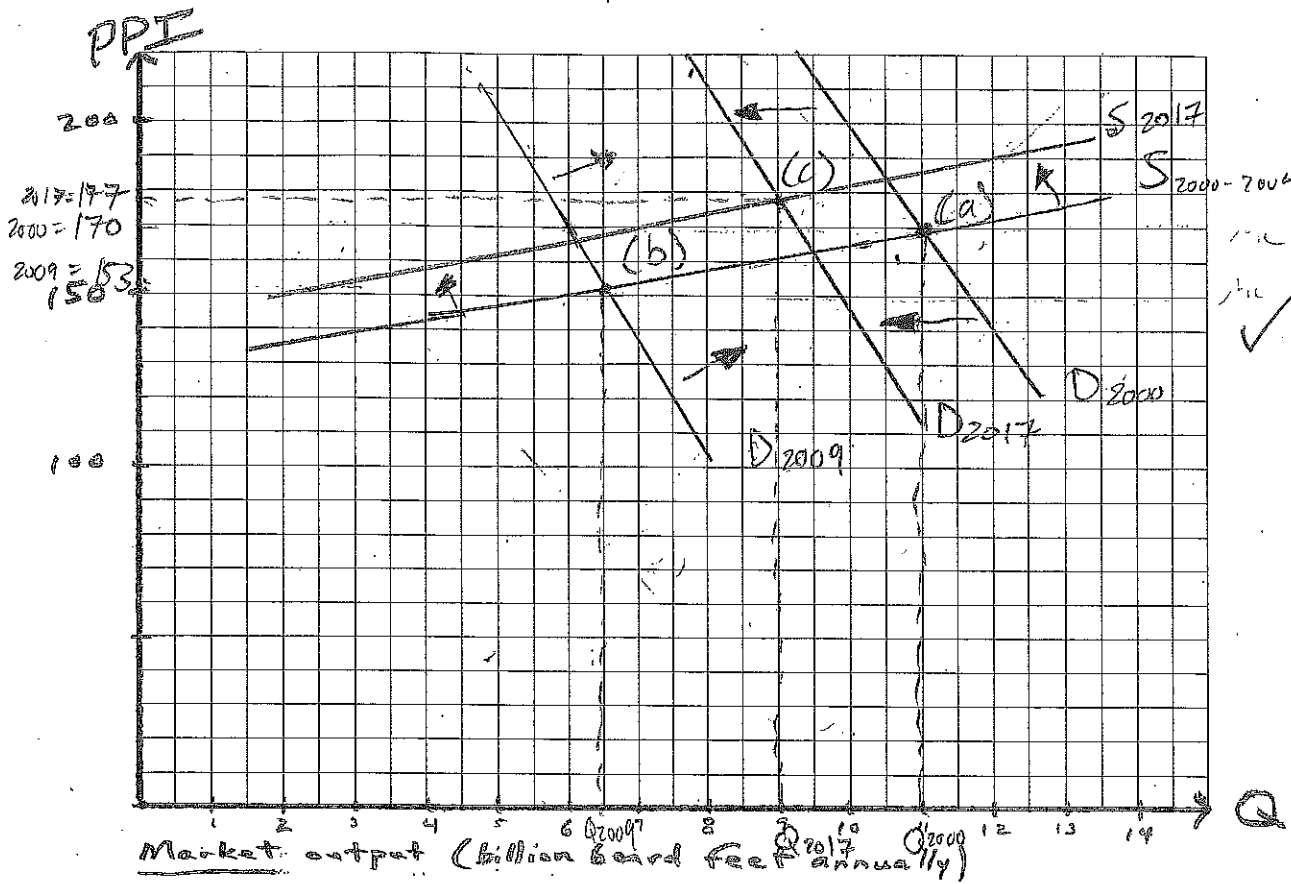
Because this perfectly competitive market was in the long-run equilibrium, supply and demand in the market interacted at  $11B$   $Q$  &  $170$  PPI. This means that no firms were earning an above normal economic return. The PPI of 170 is set by the market and becomes the perfectly elastic demand curve for the firms. The firm will produce where  $MC=MR$  (demand = MR) and since the ATC curve touches at this point, the firm generates economic profit.

- (b) The housing crisis and economic recession that started in 2007-8 knocked the bottom out of the housing market in the U.S. Construction of new houses plummeted. Hardwood lumber is used extensively in new home construction. Market output of hardwood fell to 6-7 billion board feet annually during the 2008-13 period, and the PPI for oak and maple fell to 153 in 2009. Illustrate in your diagrams and denote with (b). Briefly explain.

The housing market crash drives demand for houses down. With the decrease in demand for houses comes a leftward shift in demand for lumber (as they are complements). Demand falls so where the new market equilibrium is at  $6.5B$   $Q$  and PPI of 153. This drives the individual firm's perfectly elastic demand curve (MR) to fall to 153, below its ATC curve. You can see that the firm now suffers an economic loss represented by  $11B$  (b).

- (c) By 2017 the PPI had returned to 177 and market output was 9 billion board feet, as the U.S. economy pulled out of the recession and housing starts recovered. Illustrate in your diagram and denote with (c), and then explain what was going on at both the market level and at the firm level.

Following up with my point in part (b), firms experience an economic loss in 2009 and some firms exit the market. This reduces supply and shifts it left. As the economy pulls out of the recession and the housing market recovers, we see an increase in demand (shifting the market demand curve to the right). It does not shift back to where it was in 2000 but the combination of these shifts get the market back to  $Q$   $9B$  and PPI of 177. This increases the remaining firms' demand = MR curve up to 177. Firms produce where  $MR=MC$  and all see an increase in the firms' output to 9 billion > 82000. The firm is now experiencing economic profits represented by  $11B$ .



7. (8 pts.) Disneyland Moscow occupies a unique location in product space, just like the other Disney amusement parks around the world. They have determined that there are two primary categories of customers, (1) those who travel some distance to enjoy the park, have high discretionary income, and want to stay multiple days and (2) nearby residents who have lower discretionary incomes and only want to visit the park for a day on infrequent occasions. Disney has set the admission fee for anyone who has a local Moscow driver's license at 100 rubles, while the daily rate for non-locals is 300 rubles. Assume that the marginal cost of serving an additional customer in the park is 50 rubles. Calculate the own-price elasticity of demand for each type of customer, assuming that Disney has figured out the entry fees that maximize profits. Explain how you arrive at your answer. What type or category of price discrimination is this?

8

$$1) \frac{300 - 50}{300} = \frac{1}{\epsilon}$$

$$\epsilon = 1.2 \quad \checkmark$$

$$2) \frac{100 - 50}{100} = \frac{1}{\epsilon}$$

$$\epsilon = 2 \quad \checkmark$$

Higher elasticity indicates consumers are more sensitive to changes in price.

This indicates that local Moscow residents are less likely to visit the park after a price increase, while those traveling longer distances (and with more discretionary income) are less likely to be deterred by a price hike.

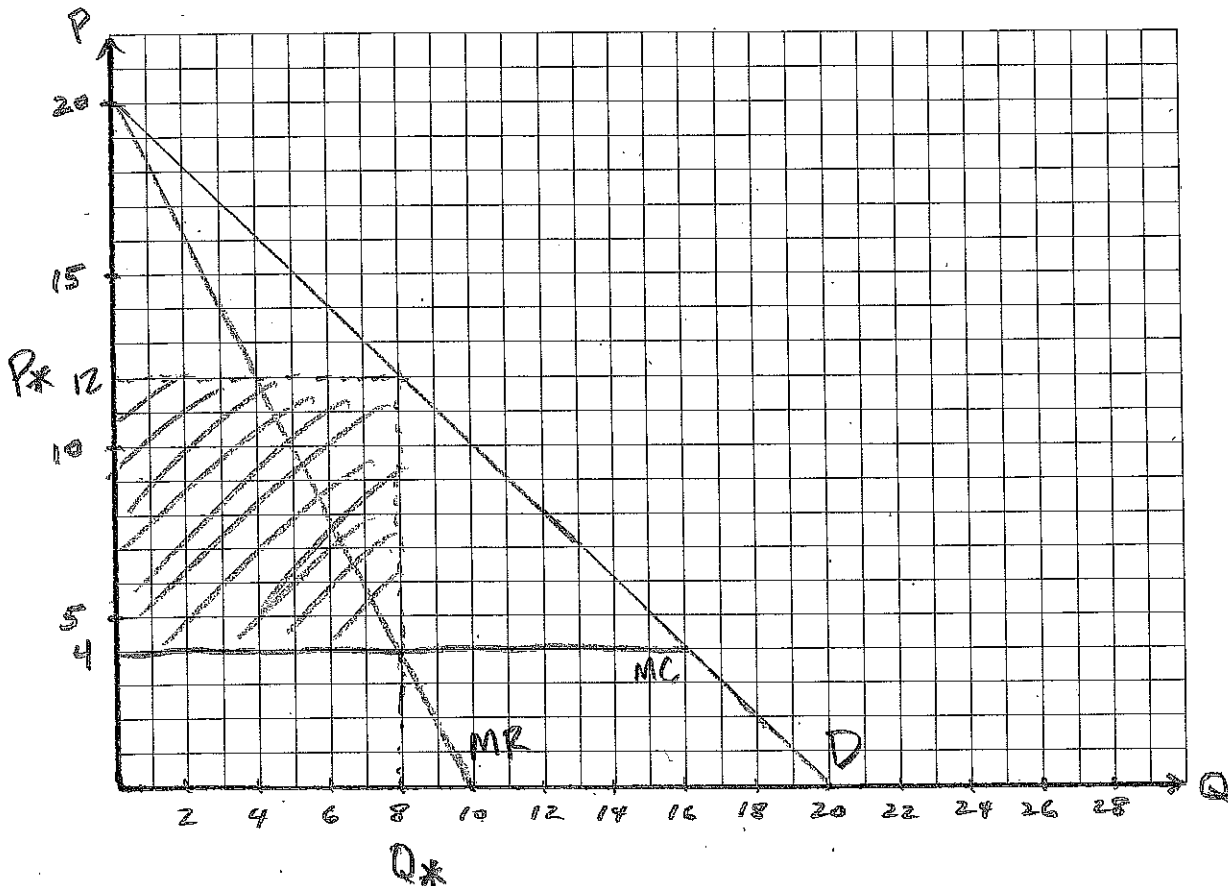
✓ - Third-degree: market segmentation

8. You live on a small island in the Aegean Sea. The island has considerable tourist potential, except that it only gets ferry service once a week. You have done research on tourism on similar Greek islands, and you have estimated that demand for hotel rooms on this island would be  $Q = 20 - P$ , if only the ferry came every day instead of once per week.  $Q$  is the number of hotel rooms demanded by tourists each night, and  $P$  is the price in euros per room. Assume that marginal costs are constant at 4 euros per room per night ( $MC=AC=4$ ).

a) (10 pts.) Suppose that the Blue Star Ferry Line announces that it will begin providing daily service to your island. If you could be guaranteed a monopoly position in this market (not outside the realm of possibility since the island governing council is dominated by your close relatives), how big of a hotel would you build, i.e. how many rooms? Hint: calculate the profit maximizing price and quantity. What would your profits be? Illustrate in the diagram below.

10

I would build a hotel with 8 rooms, since that is the quantity at which Marginal Revenue = Marginal Costs. I would charge 12 euros per room at that quantity and make 64 euros of profit per night.



- b) (10 pts.) Now suppose that the island governing council decides to grant operating licenses to two hotels, yours and one proposed by your cousin. You have never been able to fully trust your cousin, and now you are aligned against him in a simultaneous-move game—you both have to decide how much capacity (how many rooms) to build into your hotels. You have narrowed your viable choices to 4, 6, or 8 rooms. Your cousin has the same options in building his hotel. The following payoff matrix lays out the possible strategies and payoffs:

		You		
		Q=4	Q=6	Q=8
Your cousin	Q=4	32, 32	20, 36	<del>16, 32</del>
	Q=6	36, 20	24, 24	<del>12, 16</del>
	Q=8	<del>32, 16</del>	<del>16, 12</del>	<del>0, 0</del>

If you and your cousin each have to make your capacity choice simultaneously, what will be the likely outcome of this game? Explain your reasoning.

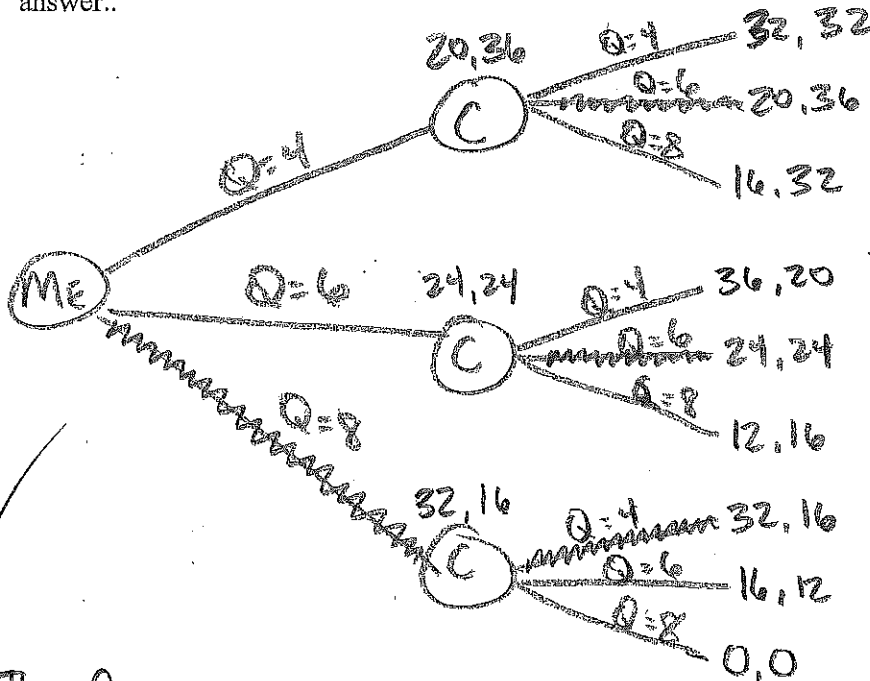
Neither of us has a dominant strategy initially, but my choice of 8 is dominated by my choice of 6, and my cousin's choice of 8 is dominated by his choice of 6. Therefore, neither of us would ever rationally choose 8. This leaves us with a new payoff matrix

		Me	
		Q=4	Q=6
My Cousin	Q=4	32, 32	20, 36
	Q=6	36, 20	24, 24

In the new payoff matrix we both have dominant strategies of choosing 6. With both of us choosing rationally the outcome will be Q=6, Q=6 with a payoff of 24, 24 as the Nash Equilibrium for this game.

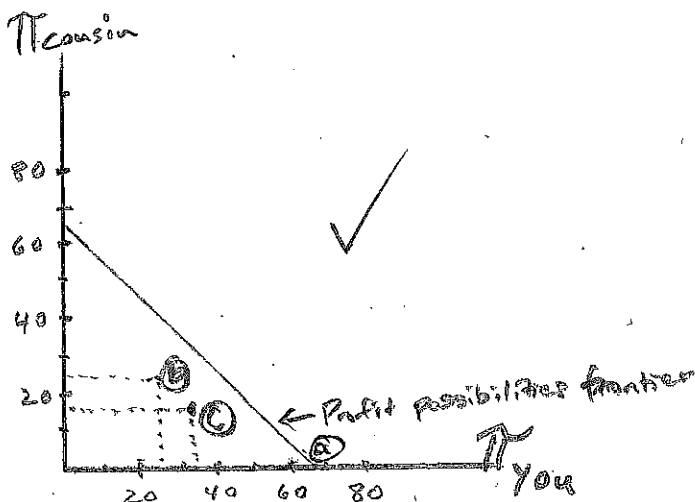


- c) (10 pts.) Instead of you and your rival moving simultaneously, suppose instead that your cousin is getting his MBA in the U.S.A. and won't be home to start his hotel for another year. So you have the opportunity to make your capacity choice and build your hotel before he gets back, and then he will make his capacity decision second after you have made the first move. Based on the information in the above payoff matrix, write out the game tree for this sequential-move game. What will be the outcome of the game? Explain the solution concepts you use in arriving at your answer..



✓  
The final outcome will be that I choose  $Q=8$  and my cousin subsequently chooses  $Q=4$ . I worked backwards by playing out my cousin's choices first based on each of my possible choices, then choosing the payoff that was best for me given what I knew my cousin would choose. I would make 32 euros vs

- d) (5 pts.) Draw the profit possibilities frontier for this market in the diagram below, where your cousin's profits are measured on the vertical axis and your profits are measured on the horizontal axis. Illustrate the three possible outcomes you have just analyzed in your diagram.



- (A) Monopoly for me = 64 euros
- (B) simultaneous move game = 24 euros for me and my cousin
- (C) sequential move game = 32 euros for me 16 euros for my cousin