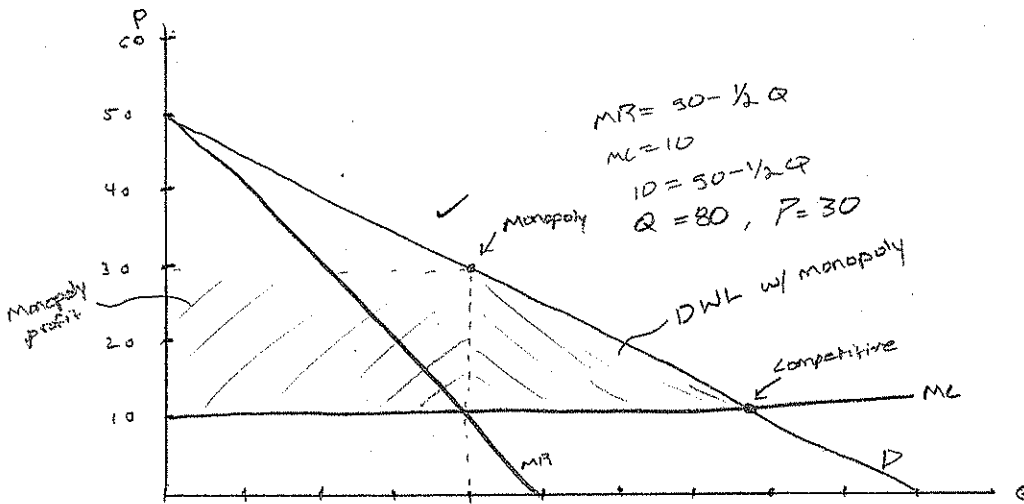


100 pts. total. Answer each question in the space provided.

1. (10 pts.) The taxicab market is characterized by constant-cost production, and  $MC = AC = 10$ . Daily demand for taxi rides in Lexington is linear, and can be represented by the following equation:  $P = 50 - Q/4$ . For the past two decades the former mayor's brother-in-law has had a monopoly on taxi services, protected by an exclusive franchise granted by city council. Several people have petitioned to be allowed to enter the taxi business, but have always been denied in the past. You are elected to city council as an at-large representative. Knowing that you are an economics major at the University of Kentucky, other council members turn to you for advice about whether to continue the exclusive franchise, or to allow entry by new competitors. What advice do you give? Explain and draw a picture.



✓ The city council should allow entry of new competitors and therefore drive down price to final consumers. This will maximize overall beneficence in the market as Deadweight Loss is gotten rid of, hence creating a more efficient market.

2. (5 pts.) The top four diamond miners control 90% of world output. DeBeers produced 50 million carats in 2008, Alrosa produced 36 million carats, Rio Tinto produced 25 million carats, and BHP Billiton produced 3.2 million carats. Assume that the other 10% was produced by ten smaller firms, each producing 1% of world output. Compute the HHI for the diamond industry.

5

	top 4 revenue: 114.2 mil	top 4 share	mktr share	HHI
Debeers	$\frac{50}{114.2} =$	44%	39%	1,521
Alrosa	$\frac{36}{114.2} =$	32%	28%	784
Rio Tinto	$\frac{25}{114.2} =$	22%	20%	400
BHP	$\frac{3.2}{114.2} =$	2.8%	2.5%	6.25
10 Small Firms	10%	-	1%	All: 10 (one = 1)

✓ HHI For Industry  $\approx 2,721.25$

4. (3 pts.) Prior to Donald Washkewicz taking over as CEO of Parker-Hannifin in 2001, how did the company set prices for its 800,000 different products?

3 Parker-Hannifin had a standard pricing scheme for all of its products. It priced at 35% above cost. Now, Parker Hannifin engages in price discrimination and charges a higher markup to products with a high elasticity of demand and a lower markup to products with a low elasticity of demand

5. (3 pts.) Briefly describe the approach Boeing has taken in the production of their new 787 Dreamliner, and the problems that have resulted.

3 Boeing has tried to outsource a great deal of their production to other manufacturers and then try and piece all the parts together. Unfortunately it is hard to maintain control over the vast number of suppliers and a range of problems (language, foreign parts, etc) has set back production at least 3 years. This is an example of distant vertical integration.

6. (3 pts.) What was the tri-county pizza war?

3 The tri-county pizza war involved pizza men who bought pizzas for less in the counties that surrounded West Liberty, where one pizza store existed, selling its product at a high price. The fact that pizza men were reaping profits without having to incur high fixed costs like other pizza firms, caused these pizza firms to reach out to city council to place restrictions on pizza sales.

7. (3 pts.) For many years Nintendo had the hand-held video game market to itself. How has that changed?

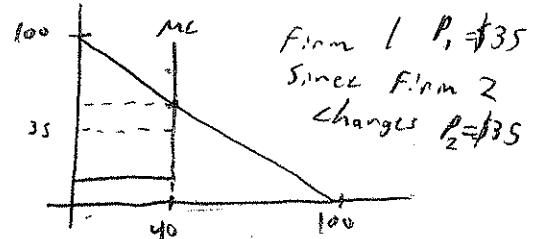
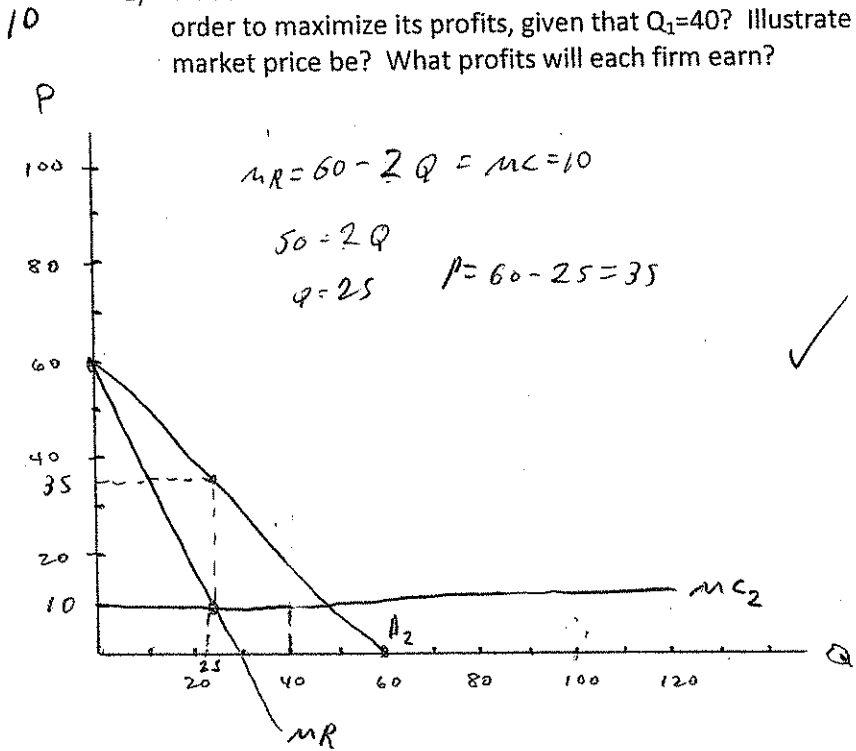
3 Apple has introduced the iPod touch and iPhone. These products allow consumers to purchase games at the iTunes store and play them on their mobile device. This puts Apple & Nintendo in direct competition with each other, although the CEO of Nintendo would not like to admit it.

8. (3 pts.) What merger in the music industry did the Antitrust Division of the U.S. Department of Justice recently scrutinize carefully?

3 The merger between Ticketmaster and Live Nation because it would greatly reduce competition for music concert sales to consumers but also reduce competition among agents competing for musical artists.

9. (20 pts.) Suppose a market with two firms producing a homogeneous product. Market demand is given by  $Q=100-P$ , where  $Q$  is market output (the sum of firm 1 and firm 2's outputs) and  $P$  is market price. Suppose also that firm 1 has irreversibly committed to a capacity of  $Q_1=40$ . Up to capacity, firm 1's marginal costs are constant at  $MC=10$ .  $MC$  becomes infinite once capacity is reached.

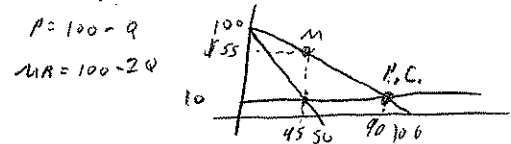
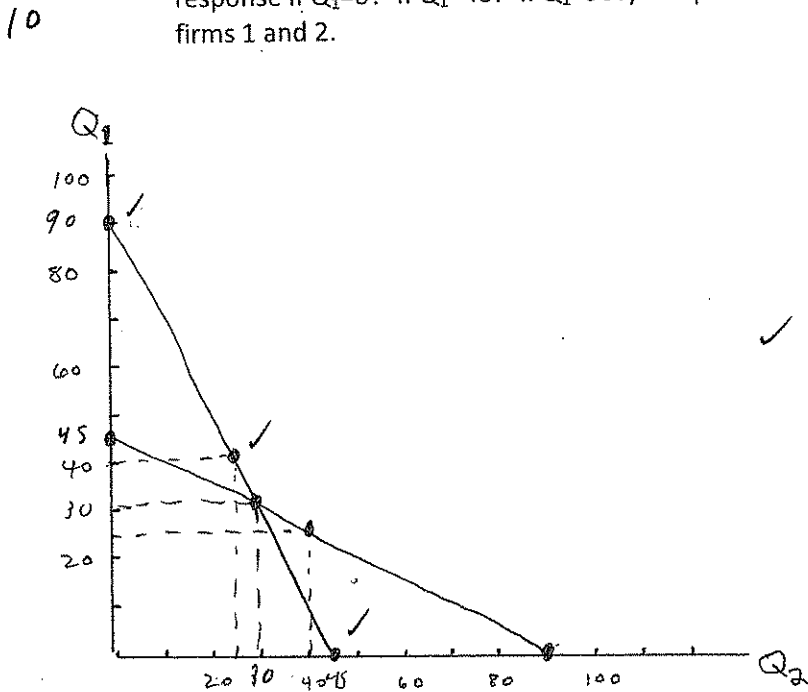
a) What does firm 2's residual demand curve look like? What output should it produce in order to maximize its profits, given that  $Q_1=40$ ? Illustrate in the diagram below. What will market price be? What profits will each firm earn?



Since firm 1 has capacity at 40, firm 2 has a market of  $P = 60 - 1$ . Firm 2 sets  $Q_2 = 25$  and  $P_2 = 35$  to max  $\Pi_2$ .

$\Pi_1 = 40(35) - 40(10) = \$1000$   
 $\Pi_2 = 25(35) - 25(10) = \$625$

b) Now suppose that firms 1 and 2 choose their capacities/outputs simultaneously. Explain what the Cournot-Nash equilibrium in this market will be. (Hint: What is firm 2's best response if  $Q_1=0$ ? If  $Q_1=40$ ? If  $Q_1=90$ ?) Graph these best response/reaction functions for firms 1 and 2.



Where the 2 best response functions cross is where the N.E. is and each firm produces  $Q = 30$ .

10. (10 pts.) Land's End and LLBean each sell jackets that are nearly perfect substitutes. As such, they play a prisoner's dilemma game repeatedly. The payoff matrix for any one play of the game is given by (where LLBean's payoff is the first number in each cell and Land's End's payoff is the second number in each cell):

		Land's End	
		P=\$69.99	P=\$59.99
LLBean	P=\$69.99	100, 100	40, 140
	P=\$59.99	140, 40	60, 60

You are in charge of setting prices for this product at LLBean. The two companies have settled into a tacitly collusive pricing pattern. Your new boss suggests to you that LLBean might increase next quarter's profits by offering a discount on this product in the forthcoming catalog. She asks you to explain the profitability of continuing a nonaggressive pricing strategy for this product, versus following her advice and offering a special sale price. Write an algebraic expression for the profitability of each pricing strategy, and explain what factors would go into your decision about which strategy would be best.

10

✓ collude  
defect.

$$V = 100 + \frac{100}{(1+r)} + \frac{100}{(1+r)^2} + \frac{100}{(1+r)^3} + \dots$$

$$V' = 140 + \frac{60}{(1+r)} + \frac{60}{(1+r)^2} + \frac{60}{(1+r)^3} + \dots$$

$\Pi_c$  = profits from collusion  
 $\Pi_M$  = monopoly-style profit  
 $\Pi_W$  = price war profit

$r$  = discount factor

To determine future profitability, we use the equations  $v(\text{collude}) =$

$$\Pi_c + \frac{\Pi_c}{(1+r)} + \frac{\Pi_c}{(1+r)^2} + \frac{\Pi_c}{(1+r)^3} + \dots + \frac{\Pi_c}{(1+r)^n}$$

and  $v(\text{defect}) = \Pi_M + \frac{\Pi_W}{(1+r)} + \frac{\Pi_W}{(1+r)^2} + \dots + \frac{\Pi_W}{(1+r)^n}$

Thus,  $v$  is the expression for getting the higher price every time (accounting for change over time) and  $v'$  is the expression for getting a very high price the first time, then a low price every period after because the trust in the collusion is gone. If  $V > V'$ , then they should continue to collude, but if  $V' > V$ , LLBean should defect.

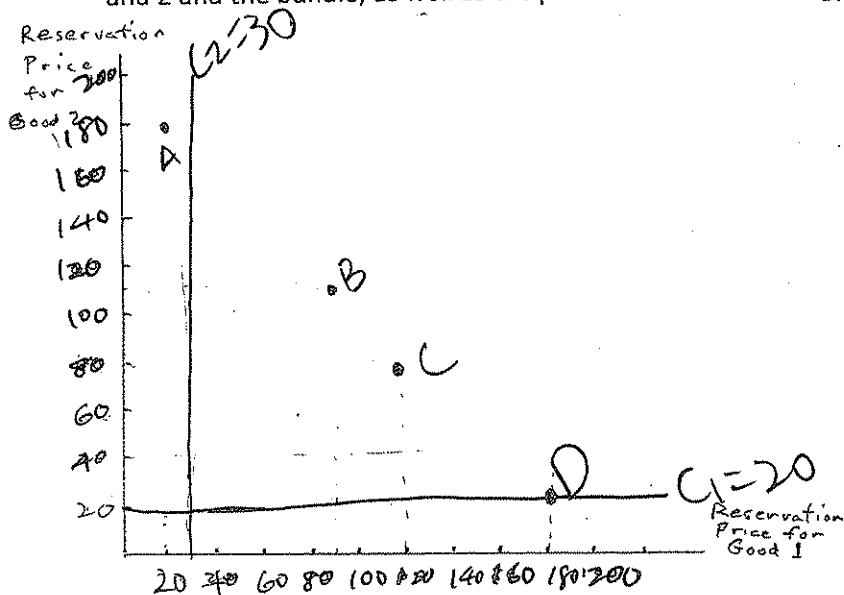
✓ The LLBean boss should consider how long-term the sale would be (for instance, if they will shortly be discontinuing the sale of these jackets, defecting is a viable option). Otherwise, defecting will only increase profits in the first period and afterwards, the collusive agreement is destroyed and both companies repeatedly defect to lower profits. also, ~~unless~~ <sup>if</sup> the discount rate is a substantial factor, it should be considered in its impact on the equation.

11. (10 pts.) You sell two products that are unrelated in demand, and also have no cost synergies. Four customers buy your products. Their reservation prices for each good are given below:

	Customer A	Customer B	Customer C	Customer D
Reservation Price for Good 1	20	90	120	180
Reservation Price for Good 2	180	110	80	20
	200	200	200	200

The marginal cost of producing good 1 is:  $C_1=20$ , and the marginal cost of producing good 2 is:  $C_2=30$ . Compare the profitability of a pure components pricing strategy, a pure bundling strategy, and a mixed bundling strategy. In your comparison, be sure to state the optimal prices for goods 1 and 2 and the bundle, as well as the profits from each strategy.

10



$P_1$	$\pi_1$	$P_2$	$\pi_2$
20	0	80	150
90	210	110	160
120	200	180	150
180	160		

So, pure components pricing we would set product 1 at 90 & make  $\pi$  of 210 & set product 2 @ 110, & make  $\pi$  of 160

- pure bundling,  $P_B = P_1 + P_2 = 200$ , so set bundle price @ 200,  $(200 \times 4) - (20 + 30) \times 4 = 600$  & make  $\pi_B = 600$  ✓

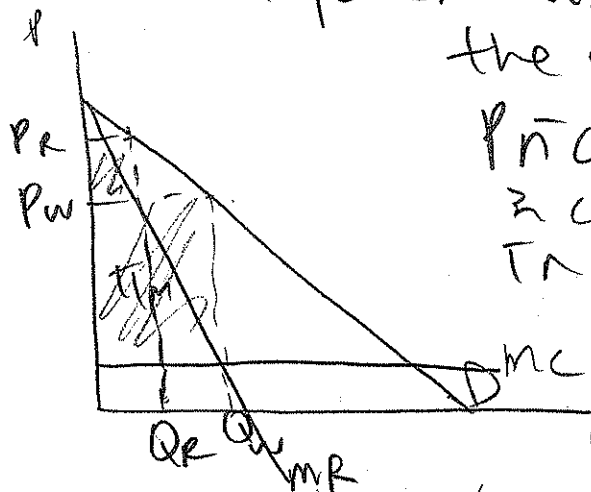
- the optimal price strategy would be mixed bundling  $P_B, P_1, P_2$ , so for customer A → product 2 @ 180, make 150, for customer D, product 1 @ 180 & make 160, for customer B & C, bundle & make  $200(2) - (50) \times 2 = 300$ , so  $\pi_{\text{mixed}} = 150 + 160 + 300 = 610$  ✓

12. (15 pts.) Suppose an upstream manufacturer that has a monopoly on a product that is sold to downstream retailers, who then sell to households who are the ultimate customers. One approach to capturing surplus from the ultimate downstream customers is for the manufacturer to simply set a wholesale price  $P_w$  and sell at that price to any retailer who wants to buy. There are three circumstances or situations where  $P_w$  will not be sufficient for capturing the maximum profits that can be earned in this vertical market. Describe each of these situations and explain why  $P_w$  is not a "sufficient instrument."

15

An upstream manufacturer can simply set a whole sale price  $P_w$  & sell to any retail who wants to buy, but this strategy would not work in 3 circumstances = ① when Retail has Market power & can double mark up. ② when there's a spill-over affect on promotions ③ when there's a variable proportion instead of fix proportion.

① the  $P_w$  would not work because Retail has market power & will mark up more: as seen in

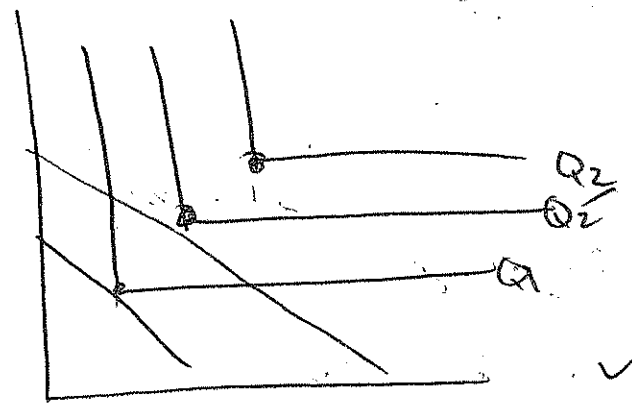


the graph, Retail marked up the price to  $P_r$  & sell only  $Q_r$  & make & cut the manufacturer's  $\pi$ , so in this case the upstream manufacturer should charge a fixed fee of  $\pi_m$  & give the product to retailer for  $MC = P$ .

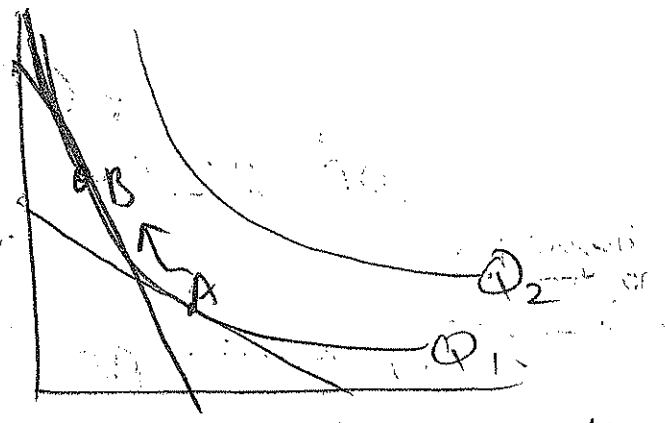
② when there's promotions needed at the local level especially for search good, the retail that does the promotion will result higher price & the customers who are price conscious will go search the good at the higher place then buy at the lower price retailer. The upstra

manufacturer can prevent that by implementing maximum Retail price or select one retailer at the local level & give that one ~~the~~ exclusive territory rights.

③ when there's 2 output to the retail the fixed proportion ones can be price  $P_w$ , but the variable ones can: see graph



fixed proportion



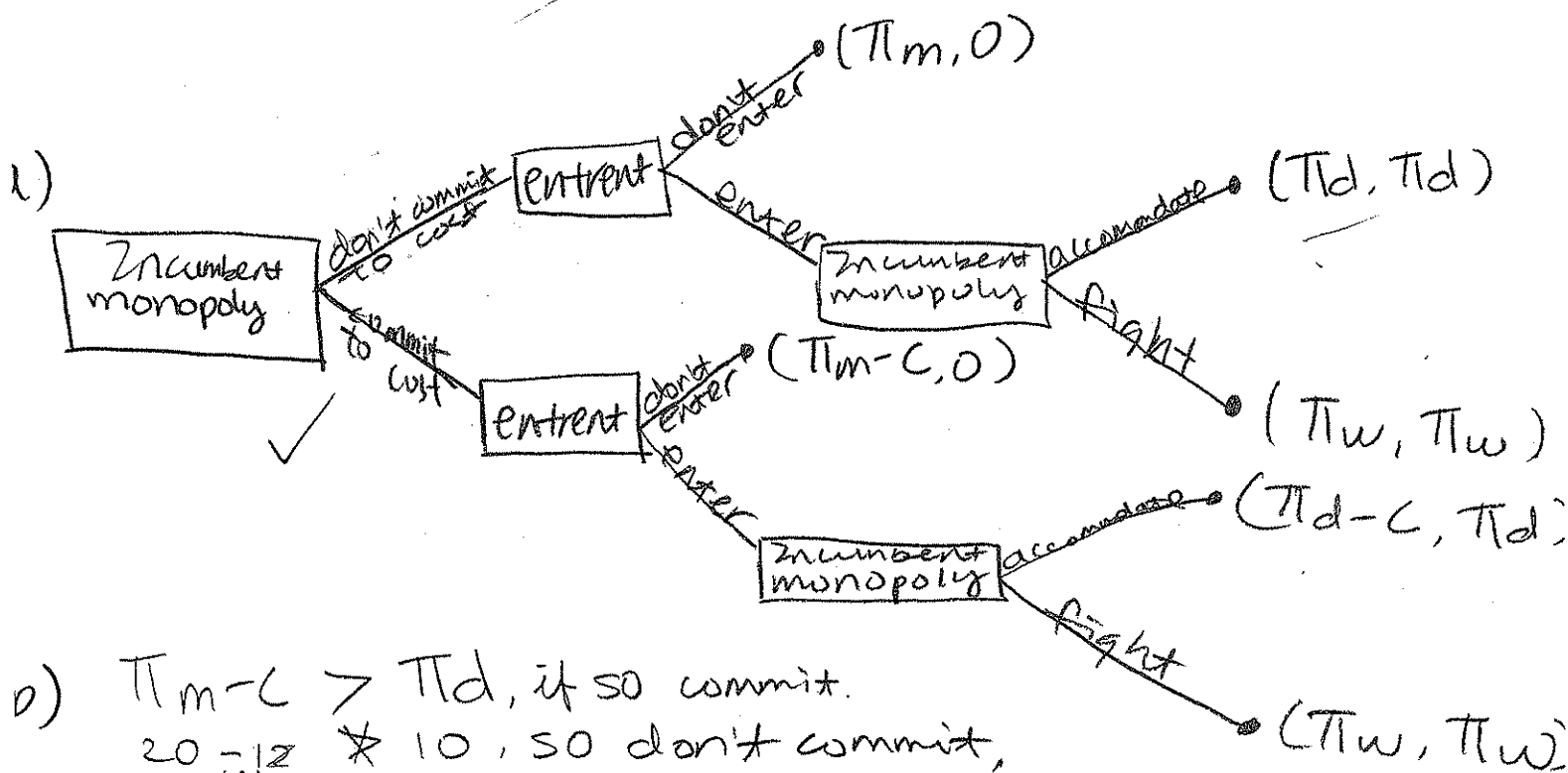
variable proportion.

for the fixed proportion, it's fine, but for variable proportion, upstream manufacturer would want to push for price B by charging a franchise fee.

13. (15 pts.) An incumbent monopolist earns economic profits, the present discounted value of which are  $\Pi_m$ . Another firm is considering entering the monopolist's market. If the monopolist reacts to entry by initiating a price war, both the monopolist and the entrant would suffer losses of  $\Pi_w$ . If the monopolist accommodates entry and shares the market, both would earn duopoly profits of  $\Pi_d$ . The monopolist has the option of undertaking an irreversible action right now in preparation to fight a price war if entry does in fact occur. This undertaking would cost  $C$  dollars and would reduce the monopolist's return by that amount if a price war is not fought, but would not affect the monopolist's return if a price war is fought.

- a) Illustrate the possibilities with a game tree.  
 b) Suppose  $\Pi_m = \$20$ ,  $\Pi_d = \$10$ ,  $\Pi_w = -\$1$ , and  $C = \$12$ . Should the monopolist commit? If it does, is its threat to fight a price war credible? What will be the outcome of the game?  
 c) Suppose  $\Pi_m = \$24$ ,  $\Pi_d = \$10$ ,  $\Pi_w = -\$4$ , and  $C = \$12$ . Should the monopolist commit? If it does, is its threat to fight a price war credible? What will be the outcome of the game?

15



b)  $\Pi_m - C > \Pi_d$ , if so commit.  
 $20 - 12 > 10$ , so don't commit,  
 the outcome would be entry & duopoly with profit  $(\Pi_d, \Pi_d)$  ✓

c)  $\Pi_m - C > \Pi_d$ , if so commit.  
 $24 - 12 > 10$ , so commit,  
 $\Pi_w > \Pi_d - C$ , if so, the threat is credible, ✓  
 $-4 > 10 - 12$ , so no, the threat is not credible.  
 the outcome would be entry & duopoly with profit  $(\Pi_d, \Pi_d)$ .