## *Economics 121:* Problem Set 4 Answer Sheet

### True/False/Uncertain: Explain your answer.

1. Although a monopolist has a smaller incentive to invest in a cost-reducing innovation than a perfectly competitive firm, at least it reduces the price it charges after the innovation, thereby benefiting consumers.

TRUE/UNCERTAIN. Recall MR = MC so if a cost-reducing innovating makes MC go down, MR will go down as well. Since MR decreases as p decreases, then a decrease in MR will imply a decrease in p. This is what we referred to as the (cost) "pass through rate." In the case of linear monopoly, it is 50%: for each \$1 decrease in unit cost, monopoly price will be reduced by \$0.50. Note that a competitive firm who innovates may not have an incentive to reduce price. For instance, consider Bertrand competition – if one firm invests in cost savings it will simply undercut the other firms by as little as possible and gain the full market. The reason you might say this statement is uncertain is that it might not be the case that the monopolist has less incentive – for example if by cutting costs the monopolist deters entry it may reap monopoly profits for an extended time – the key here is that in a dynamic setting the difference in incentives to the monopolist and competitive firm may be different.

2. Selling a product below cost is predation.

FALSE/UNCERTAIN. Selling a product below its cost (marginal or otherwise) is one mechanism firms use in predation. It does not have to signal predation, however. Grocery stores commonly sell turkeys below cost at Thanksgiving in order to pull people into the store and get them to buy all the other items they need (this is called a loss-leader). It would be hard to argue that Safeway is intending on driving Albertson's out of the market with such a tactic. Instead it is a temporary marketing strategy.

3. Large fixed costs and difficulty in selling off capital assets make predation less likely.

UNCERTAIN. These large fixed costs and difficulty selling off capital assets will mean that firms facing predation are going to be more likely to try to weather the storm longer and are less likely to exit when the predator undercuts prices, floods the market, etc... This makes predation less successful and thus we would think less likely. However, if the predator firm did in fact succeed in driving out the other firm(s), the large difficult-to-recover fixed costs are going to serve as a barrier to entry for new firms and thus makes predation more profitable should they predator be able to drive the other firm(s).

4. Vertical mergers are total-welfare enhancing.

UNCERTAIN. Vertical merges can be total-welfare enhancing, such as mergers between upstream and downstream monopolists, where the double marginalization problem is eliminated. However vertical merges can harm total-welfare if they increase monopoly power in one sector – if merging firms refuse to sell to non-merged firms, for instance. 5. There is no difference in final market outcome between an industry structure with a single vertically integrated monopolist and a structure with an upstream monopolist facing a perfectly competitive downstream.

TRUE. In terms of final price and quantity to consumers nothing is changed. The competitive downstream is selling at cost, which is set by the wholesale price charged by the upstream monopolist. So the upstream monopolist is setting the final market price and quantity anyway and reaping all of the profits – there would then be no difference if the upstream monopolist were simply merged with the entire downstream into one vertically integrated monopolist. (This is of course assuming that there are no cost advantages or disadvantages to the merger)

6. Because a horizontal merger reduces the number of firms in an industry, it raises price, thus hurting total welfare.

FALSE. If the reason for the merger was that it created cost savings, this might not be the case. First consider the proposition that price is increased: The fact that the number of firms has fallen increases market power and puts upward pressure on price, but if the cost savings were high enough, the firms may actually lower price in the market. Even if the price does rise, however, total welfare may still improve if there are cost advantages. If the merger makes the firms much more efficient and thus yields greater profits without increasing the price to consumers by much, total welfare may improve.

# **Multipart Questions:**

- Kia Motors manufactures cars that are sold through dealers. The (daily) demand for Kia cars in a certain market is given by D(p) = 30 p, and let the (constant) marginal cost of manufacturing a car be: MC = 5. (All prices and costs are expressed in units of thousands of dollars to make these conditions realistic.) To begin with, assume that Kia does not own its dealers but instead sells the cars to them at a wholesale price of w.
  - a) If there is a single dealer with an exclusive right to retail Kia's, find the profit-maximizing retail price it will charge, along with the quantity and the dealer's profit, given a wholesale price w per car.

We assume that that the dealer will take the price w as given (note that this may be a big assumption since the dealer is in fact a monopsonist). The dealer will then set MR = MC taking MC = w and MR = 30-2Q, and thus we can solve for the quantity sold contingent on w which the dealer takes parametrically.

$$30 - 2Q = w \Rightarrow Q(w) = 15 - w/2, \quad p(w) = 30 - Q(w) = 15 + w/2$$
  
$$\pi_{Dealer}(w) = [p(w) - w]Q(w) = [30 - w]^2/4 = (900 - 60w + w^2)/4 = 225 - 15w + .25w^2$$

b) Now look at the manufacturer's problem: find the wholesale price that maximizes the manufacturer's profit, and then compute the corresponding quantity of Kia's, plus the profit levels of both the manufacturer and the dealer at this wholesale price.

Kia uses Q(w) as it's own demand function, which has inverse demand w(Q) = 30 - 2Q and so MR(Q)=30 - 4Q. Setting Kia's MR = MC implies

$$\begin{aligned} 30 - 4Q &= 5 \Rightarrow Q^* = 25/4 = 6.25, \ w^* = 30 - 12.5 = 17.5, \ p^* = 15 + 17.5/2 = 23.75 \\ \pi_{Dealer}^* &= (p^* - w^*)Q^* = (25/4)^2 = 625/16 = 39.0625 \\ \pi_{Kia}^* &= (w^* - 5)Q^* = 25/2 \times 25/4 = 625/8 = 78.125 \end{aligned}$$

c) Kia considers buying the dealer. What would the equilibrium price and profit be if it did undertake both manufacture and retailing of its cars? Compare this price against your answer in (b).

### Then Kia can just set MR = MC in the simple monopoly setting

 $\begin{array}{l} 30-2Q=5 \Rightarrow Q^{M}=25/2=12.5, \ p^{M}=30-12.5=17.5<23.75=p \ *\\ \pi^{M}=\left(p^{M}-5\right)\!\!Q^{M}=\left(25/2\right)^{2}=625/4=156.25 \end{array}$ 

### The price is lower under the vertically integrated monopoly.

d) If, instead, there was perfect competition in retailing of Kia's, at what level would the manufacturer set its wholesale price?

If retail is perfectly competitive than we can expect p = MC = w. So Q(w) = 30 - w, or w(Q) = 30 - Q So Kia faces the same problem as in (c) and so Kia will set the price p'=17.5, and earn profits  $\pi'=156.25$ 

e) Find Kia's profit level at the price in (d), compute the associated profits, and compare them against profits found in (b) and (c).

As we saw profits in (d) are the same as in (c). Relative to (b) we can see that profits are higher than when each link of the chain operates as a monopoly.  $\pi' = \pi^M = 156.25 > 117.1875 = 78.125 + 39.0625 = \pi *_{_{Kia}} + \pi *_{_{Dealer}}$ 

2. Waffle World makes frozen waffles and sells them successfully all over the country using a secret family recipe. Recently Frenchy's Toast Company engaged in a bit of corporate espionage and stole the secret recipe. Frenchy's is now considering entering the frozen waffle market. Waffle World has threatened to take Frenchy's to court if they use the stolen recipe.

	Waffle World Profits	Frenchy's Profit
F: no enter	10	0
F: enter; W: goes to court	4	2
F: enter; W: does not go to court	5	5

a) Draw the extensive form of this game, in which Frenchy's first decides on entry and then Waffle World decides whether to go to court or not.



b) Is Waffle World's threat to go to court credible?

No. If Frenchy's enters, Waffle World will be faced with a choice of going to court and getting a payoff of 4 versus not going to court and getting a payoff of 5. The rational thing for Waffle World to do is not go to court, thus Frenchy's knows that Waffle World's threat is not credible.

c) Will Frenchy's enter?

Yes. Frenchy's (by using backward induction) anticipates that Waffle will not go to court if Frenchy's enters. So Frenchy's compares the profit of entering and not going to court (5) with not entering (0) and chooses to enter.

Instead imagine that Waffle Corp is considering hiring a lawyer to join their staff before seeing whether Frenchy's decides to enter or not.

	Waffle World Profits	Frenchy's Profit
F: no enter	6	0
F: enter; W: goes to court	6	-1
F: enter; W: does not go to court	3	5

The payoffs if Waffle Corp hires the lawyer are as follows:

d) Give an intuition for the way in which these payoffs differ from the payoffs in the case when Waffle Corp does not higher the lawyer.

Hiring the lawyer is expensive. Waffle is now paying the lawyer so even if Frenchy's doesn't enter Waffle's profits are lower (6 instead of 10). However the lawyer becomes especially useful if Waffle decides to go to court. In this case the lawyer is so good that Waffle gets a big settlement (actually gets the same payoff -6 - as if Frenchy's never entered)

e) Draw the new extensive form where first Waffle decides whether to hire the lawyer, after observing that choice Frenchy's decides whether to enter or not.



f) Will Frenchy's enter the market in this case? Explain how you came to your conclusion.

No Frenchy's will not enter. To see this we need to work backward. In the half of the tree where W does not hire, we've already seen that W will not go to court if Frenchy's enters, thus Frenchy's will choose to enter and they will get payoffs (5,5) if W does not hire the lawyer. If W does hire the lawyer, then should Frenchy's choose to enter, W will find it profitable to go to court (6 versus 3), this then deters Frenchy from entering (0 is better than -1). So the final decision is for W to hire or not hire anticipating a payoff of 5 from not hiring and 6 from hiring. Thus W hires the lawyer and Frenchy's chooses not to enter.

- 3. For each one of the computer industry business practices described below, give reasons why each one may both:
  - (i) realize economic efficiencies, and
  - (ii) harm consumers and/or competition.
  - a) Personal computer software makers bundle several software applications into a "productivity suite."
    - i) Economic efficiencies may be realized through such measures as supply-side savings on packaging, shipping, marketing/advertising, and customer support. On demand side, users (and PC makers is factory installed) would save time installing all programs all at once. Perhaps more important would be the greater integration of software programs with user benefits in the form of greater interoperability of files, uniform user interface, and so on.
    - Bundling may hurt consumers in that the firm may be able to extract a greater portion of consumer surplus. A firm may also bundle goods for the purpose of keeping competitors out of the market. Some have viewed Microsoft's bundling of its Internet Explorer with Windows as a means by which to rid the browser market of Netscape. Since the fear was that applications might be run on browsers, the elimination of Netscape would serve as the elimination of a threat to Microsoft's operating system monopoly.

- b) IBM provision of software and service to customers who buy or lease its mainframe computers.
  - i) Customers who already made purchases of IBM mainframe products face a lower price (perhaps close to zero) for the after market service from the same mainframe manufacturer. This prevents customers from purchasing software and getting service from other providers. Essentially, this practice produces a "lock-in" of customers in the same brand not only for mainframes, but also for related services and products. By doing so, IBM effectively excludes other providers for these services and products.
  - ii) Efficiency may derive from improved functioning of the mainframes and computers sold or leased. IBM argues that their computers work better with the software they produce, rather than with competing software from different producers. The same argument works for service: only IBM technicians know IBM computers so well that they can do the appropriate service.