

# 14.27 Exam 1 Solutions

10/8/2014

## 1 T,F,U

a)

F. Two explanations come to mind. The first is that online stores still compete with brick and mortar stores, so purchasing from some firms may require consumers to face a transportation cost. The second is that the “transportation” cost is a metaphor for the disutility of purchasing a good that does not completely align with your preferences. Thus, even if there is no physical distance on the Internet, as long as there is heterogeneity in tastes and differentiation across firms in the goods provided these models will still be valid.

b)

F. Auctions were not invented by Sotheby’s, and looking at Ebay’s experience, it is not clear that auctions have been growing in popularity in the past few years. The introduction of buy it now has shifted many goods in this website from being sold at an auction to being sold with a posted price.

c)

U. Being a large buyer is not enough to exert countervailing power. The buyer must also be able to credibly commit to only carry one supplier, as we learned from Ellison and Snyder.

d)

F. It is performed every 5 years, and gathers information on all companies, not just publicly-traded companies.

e)

F. The Bertrand model predicts a single price.

f)

F. In the simple model of monopoly pricing, the firm maximizes profits as if it has no rivals.

g)

T. If entry costs are increasing/decreasing for subsequent entrants, one should expect there to be an advantage/disadvantage of being an early entrant. This advantage/disadvantage should affect the evolution of market leadership over time.

2

a)

In this case, firm competition is represented by the Bertrand model. Since  $MC = 20$ , we have  $P^* = 20$ ,  $Q^* = 2N$ . If any firm charges a lower price, it gains the whole market but makes a negative profit on all units sold. If a firm charges a higher price, it has zero market share.

b)

In this case all consumers face the search cost, so we can model the situation as in the Diamond search model. We know that if all consumers have cost  $s$  of obtaining a price quote, where  $0 < s < CS(p^M)$ , then the unique NE is  $P_1^* = P_2^* = \dots = P_N^* = p^M$ . Monopoly price is:

$$\max_p (p - 20) \left(3 - \frac{p}{20}\right) \Rightarrow P^M = 40, Q^M = 1 \text{ (per individual)}$$

Since  $Q = 3 - P/20$ ,  $P = 60 - 20Q$ . Then  $CS(p^M) = (60 - 40) \cdot (1) / 2 = 10$  (per individual).

In both cases the conditions for the aforementioned unique NE hold, so the price is 40.

c)

The standard assumption of market coverage is that all consumers buy. Then the indifferent consumer is such that:

$$120 - (85 - x) - P_{D_k} = 90 - (x - 45) - P_{M_k} \Rightarrow x^{INDIFF} = 50 + \frac{P_{D_k} - P_{M_k}}{2}$$

Then demand for firm  $D_k$  is:  $85 - 50 - \frac{P_{D_k} - P_{M_k}}{2} = 35 + \frac{P_{M_k} - P_{D_k}}{2}$ , and its' profit maximization problem is:

$$\max_{P_{D_k}} (P_{D_k} - c) \left(35 + \frac{P_{M_k} - P_{D_k}}{2}\right) \Rightarrow 35 + \frac{P_{M_k} - 2P_{D_k} + c}{2} = 0 \Rightarrow P_{D_k} = 35 + \frac{P_{M_k} + c}{2}$$

And demand for firm  $M_k$  is:  $50 + \frac{P_{D_k} - P_{M_k}}{2} - 45 = 5 + \frac{P_{D_k} - P_{M_k}}{2}$ , and its' profit maximization problem is:

$$\max_{P_{M_k}} (P_{M_k} - c) \left( 5 + \frac{P_{D_k} - P_{M_k}}{2} \right) \Rightarrow 5 + \frac{P_{D_k} - 2P_{M_k} + c}{2} = 0 \Rightarrow P_{M_k} = 5 + \frac{P_{D_k} + c}{2}$$

In equilibrium, we have that:

$$P_{D_k} = 35 + \frac{5 + \frac{P_{D_k} + c}{2} + c}{2} \Rightarrow P_{D_k} = 70, \text{ and } P_{M_k} = 50.$$

$$\text{Then } x^{INDIFF} = 60, Q_{D_k} = 25, Q_{M_k} = 15$$

d)

At equal prices, consumers who prefer chocolate with 50% cacao or less buy milk chocolate, and consumers who prefer chocolate with more cacao buy dark. In equilibrium, the division is at 60% cacao. Since all consumers purchase the good, the price paid by consumers is simply a transfer from consumers to producers, and no welfare differences arise from this transfer. Then the only effect of pricing on welfare is through the allocation of consumers to firms, and equilibrium pricing can lower welfare by inducing consumers to purchase from a suboptimal firm. What is the optimal split of consumers, from a welfare perspective? Since marginal costs are equal across firms, it is the split induced by equal prices. Therefore, we can see that in equilibrium we have a loss of welfare arising from a misallocation of consumers to firms.

3

a)

$$\begin{aligned} \text{Under a posted price, the seller solves: } \max_p p \cdot Pr(v_{(2)} > p) &= \max_p p \cdot (1 - p^2) \\ \Rightarrow 1 - 3p^2 = 0 \Rightarrow p^{POSTED} &= \frac{1}{\sqrt{3}}. \quad E(\pi^{POSTED}) = \frac{1}{\sqrt{3}} \left(1 - \frac{1}{3}\right) = \frac{2}{3\sqrt{3}} = \\ 0.385 \end{aligned}$$

b)

This is a sequential game, and it is solved by backwards induction. If the seller is facing the second buyer, it sets a price such that:

$$\begin{aligned} \max_p p \cdot Pr(v > p) = \max_p p \cdot (1 - p) \Rightarrow 1 - 2p = 0 \Rightarrow p^{SECOND} &= \frac{1}{2}, \\ E(\pi^{SECOND}) &= \frac{1}{4} \end{aligned}$$

In the first period, the seller will take this into consideration, maximizing:

$$\begin{aligned} \max_p p \cdot Pr(v > p) + Pr(v < p) \frac{1}{4} &= \max_p p \cdot (1 - p) + p \frac{1}{4} \Rightarrow 1 - 2p + \frac{1}{4} = 0 \\ p^{FIRST} = \frac{5}{8}, \quad E(\pi^{FIRST}) &= \frac{5}{8} \left(1 - \frac{5}{8}\right) = \frac{15}{64} \end{aligned}$$

$$\text{Expected profits are } E(\pi^{SEQ}) = \frac{15}{64} + \frac{1}{4} Pr(v < \frac{5}{8}) = \frac{15}{64} + \frac{1}{4} \cdot \frac{5}{8} = \frac{25}{64}$$

c)

No. In a sequential auction, the second period consumer is competing against no one, and thus has no incentive to bid above 0. The first period consumer

anticipates this and also bids zero. As a result, the auction price is 0, and profits are 0.

## 4

### a)

Ebay (and all auction websites) are two-sided platforms, and as such the attractiveness of the platform to sellers and buyers depends not only on the fees directly charged to them but also on the number and quality of counterparts and competitors that each group faces. Therefore, sellers will find the site more attractive if more buyers are present, and buyers will find the site more attractive if more sellers are present.

The idea of eliminating listing fees directly lowers costs for sellers, which would seem like a good thing, but it also creates a greater incentive to post low quality items with low selling probabilities in the hope that they sell. This would decrease the attractiveness of the site to buyers, which hurts sellers. On net, it is not clear whether eliminating listing fees would attract more sellers.

Empirical evidence suggests that having no listing fee is a bad idea. Yahoo auctions functioned with such a model, and had lower selling rates than Ebay. Ultimately, this site failed.

### b)

The positive nature of network externalities in this market is that a greater number of sellers attracts more buyers and vice-versa, as discussed earlier.

The negative nature of network externalities in this market is that the number of competitors in my same group decreases the attractiveness of the site, as the ability to extract rents is diminished.

### c)

Going for a specific category of goods can be a smart idea if it is easier to create critical mass on both sides of the market this way, so that buyers and sellers can enjoy the positive nature of network externalities. However, if buyers value sellers in all categories, not just one, then the site can be left with a lot of sellers and not many buyers, creating a disincentive for sellers to list.

MIT OpenCourseWare  
<http://ocw.mit.edu>

14.27 Economics and E-Commerce  
Fall 2014

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.