Econ 101 Midterm-Answer Key Prof. Dan Friedman 1

1 Part I. Short answers.

1. Independent coffee shops emphasize product quality and customer satisfaction; new shops often open and the less successful shops go out of business. For these reasons, the industry is best described by the perfect competition model.

A: It is more like monopolistic competition since goods are not perfect substitutes (especially with focus on customer satisfaction). (Nearly) Free entry and exit are consistent with both monopolistic competition and perfect competition.

2. A perfect example of the Principal/Agent problem is an employee who spends much of his time on the job browsing Facebook.

A: Pretty good example as far as it goes. Employee acts on firm’s behalf but has his own goals, and Facebook browsing probably doesn’t help the firm.

3. Pundit Abel says, “Concentration measures such as the Hirshman-Hirfindahl index overstate industrial concentration because they ignore foreign competition." Pundit Baker says, “No, those measures understate the degree of concentration in local markets such as truck rentals." Who (if anyone) is right?

A: In some circumstances, Abel is right that the market definition should be international, e.g. for gold, and the HHI then should be for global shares. In other circumstances, e.g. local truck rentals, HHI should be computed for a geographically limited market instead of the usual national market.

4. A firm produces quantities q1 and q2 of two products at total cost C(q1;q2) = 5q1 +5q2 -0:2q1q2 -0:01lnZ Here Z is the sum of the (q1) quantities produced since product 1 was first introduced in 2002. Does the firm have economies of scale in either good? Economies of scope? Cost complementarities? A learning curve effect? Explain very briefly why or why not.

A: The function does not exhibit economies of scale. The average cost is almost constant except for the 5q-i term, which isn’t really fixed cost. Economics of scope: yes! due to the term 􀀀0:2q1q2. Learning curve: yes! due to the term -0:01lnZ.

2 Part II. (Slightly) Longer Answer. 100 words maximum. 8 points.

A 1/28/12 article in the Economist magazine, “Boeing: Faster, Faster, Faster," notes that production of the new 787 Dreamliner airplane has been delayed, with considerable loss of profit, because many suppliers were not able to provide parts (from rivets to horizontal stabilizers) on time of sufficient quality and in sufficient quantity. Please comment, using relevant Econ 101 concepts such as transaction costs, specialized assets, etc.

A: Boeing tried to outsource lots of 787 components, and now faces the downside of that decision. Some of the components (e.g. stabilizers) require specialized investments, since these components are only for 787 and not much good for anything else. Evidently the supplier contracts did not give them sufficient incentive to ramp up production and quality control to meet Boeing’s needs. It is a complex contracting environment, so despite high cost, Boeing may have to vertically integrate with some suppliers or build their own capacity to produce the more specialized components of the 787.

3 Part III

1. There are 11 firms in industry A. The largest has $10 million in revenue, and each of the others has $1 million.Industry B has four firms, each with sales of $5 million. Compute FFI=C4 and HHI for each industry. Which industry is more competitive? (6 pts)

A: Total sales (T)= 20; C4A = 1/2+3(1/20) = 13/20 = .65; C4B = 4(1/4) = 1

HHIA = (1/2)2+10(1/20)2 = .25+10(.0025) = .275

HHIB = 4(1=4)2 = .25

I’d agree with HHI - A has a firm that could have considerable market power.

2. Industry demand for Smidgens is approximated by lnQ = 20 – 1.5lnP. The local Smidgen producer has

marginal cost 5 and demand approximated by lnq = 10-3.0lnP+0.5lnA. Here A represents the advertising

budget, and as usual ln is the natural logarithm, P is price and q and Q are the number of units sold. Please estimate the local producer’s:

(a) Demand elasticity and profit-maximizing price. (3pts)

A: xq;p = -3.0; p = xq;p (xq;p+1)mc = 7.5

(b) . Advertising elasticity and profit-maximizing ad budget (as a fraction of revenue). (3pts)

xq;p = 0.5; A

A: R = xq;A/(.xq;p) = .5/3 = 1/6

(c) Lerner Index. (2pts)

A: L = (p-mc)/p = 2.5/7.5 = 1/3

(d) Rothschild Index (i.e., the index for the Smidgen industry). (2pts)

A: RI = xq;p(-xQ;P) = -1.5/-3.0 = 1/2

3. The local Gombat industry consists of two identical firms, facing inverse market demand approximated by P =150 - 2Q. The cost function for each firm is C(Q) = 6Q.

(a) What is the maximum profit that could be achieved in the industry if the firms colluded? What is the

corresponding output quantity Q and price P? (3pts)

A: Collusion implies firm act like a monopolist. Therefore, let’s compute the profits in that case Pi= PQ-6Q

The monopolist picks (Q,P) such that MR = MC, so 150-4Q = 6, Q = 36, P = 78. And profits are equal to (78-6)\*36 = 2592. Therefore, each firm gets 72\*18 = 1296.

(b) Suppose that the firms independently choose quantities q1 and q2 once and for all, so Q = q1 +q2. Find

quantities (and corresponding price and profits) so that neither firm has an incentive to change its quantity.

(4pts)

A: This is a cournot model. We will find best-responses (in term of quantities) and solve the equilibrium

output and price.

For firm 1: 150-4q1 -2q2 = 6 and for firm 2: 150-2q1 -4q2 = 6. The reaction function r2(q1) =

(144-2q1)=4 Solving for q2, -150+6q2 = -6, q2 = 144=6 = 24 and q1 = 24.

Solving for prices, p=150-2(48)=150-96=54. so profits for each firm are equal to (54-6)24=1152

(c) Suppose instead that firm 1 has been around longer and can stick to a quantity q1 that firm 2 must take as

given. In this situation, which once and for all choices of quantities will each firm choose, assuming that

their goal is to maximize profit? What are the corresponding profits and price? (3pts)

A: Firm 1 is the leader. The objective function of firm one is then

maxq1\_0 p(q1; r2(q1)) = (150-2q1+(6-150)/2+q1)q1-6q1.

The FOC is (150-6)=2-2q1 = 0, q1 = 144/4 = 36

and q2 satisfies (from the BR), (150-6)/4-2 \* 36-4 = q2 , q2 = 18

(d) Now suppose, more realistically, that the firms can change their output quantities every so often, say once each month. Under what conditions could they achieve successful collusion (as in part a. above) as a Nash equilibrium? Be specific in terms of the strategies the firms follow, their expectations about (and

discounting of) the future, etc. (4pts)

A: here, we have to compare the outcome of cournot against cartel(collusion). The profits under cartel is equal to 72\*36, and the profits under cournot is equal to 48\*24. The missing information is the payoff of deviating from the collusion outcome and the interest rates. Let’s assume that one firm sticks to the collusion quantity (18) and the other decides to best response given that outcome. Following the same steps as before, the profits for the deviation is 1296.The extra benefit of deviating from the collusion is 162 and the penalty (going to cournot outcome) is -144. Collusion is feasible when 162-144/r < 0, i.e., when r < 144/162.

To fill in details, we said that the extra benefit is 162. Where does this number come from?

r2(q1) = (144-2q1)/4 =27 is best response to q1 = 18. The corresponding price is 60, and corresponding profit is (60-6)\*27 =  1458 for the firm that defects. minus 1296 (part a, cartel profits) we get 162 as the temptation. Collusion is worthwhile if this exceeds the PV of the per period loss in the future. That loss is

144 (= cartel profit less Cournot profit, from parts a and b); to get the PV you divide by the interest rate r.