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.

   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.

   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?

   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 q_1 and q_2 of two products at total cost $C(q_1,q_2) = 5q_1 + 5q_2 - 0.2q_1q_2 - 0.01\ln Z$ Here Z is the sum of the (q_1) 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.

   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 $-0.2q_1q_2$. Learning curve: yes! due to the term $-0.01\ln Z$.

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.

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)

   Total sales (T)= 20; $C4_A = 1/2 + 3(1/20) = 13/20 = .65$; $C4_B = 4(1/4) = 1$

   $HHI_A = (1/2)^2 + 10(1/20)^2 = .25 + 10(.0025) = .275$

   $HHI_B = 4(1/4)^2 = .25$

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

2. Industry demand for Smidgens is approximated by $\ln Q = 20 - 1.5 \ln P$. The local Smidgen producer has marginal cost 5 and demand approximated by $\ln q = 103.0 \ln P + 0.5 \ln A$. 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)
   $\xi_{q,p} = -3.0$; $p = \frac{\xi_{q,p}}{(\xi_{q,p}+1)} mc = 7.5$

   (b) . Advertising elasticity and profit-maximizing ad budget (as a fraction of revenue). (3pts)
   $\xi_{q,p} = 0.5$; $\frac{A}{R} = \frac{\xi_{q,A}}{(-\xi_{q,p})} = \frac{.5}{3} = 1/6$

   (c) Lerner Index. (2pts) $L = (p - mc)/p = 2.5/7.5 = 1.3$

   (d) Rothschild Index (i.e., the index for the Smidgen industry). (2pts) $RI = \frac{\xi_{q,p}}{(-\xi_{Q,P})} = -1.5/-3.0 = 1/2$

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)
   Collusion implies firm act like a monopolist. Therefore, let's compute the profits in that case

   $$\pi^{\mathrm{M}} = PQ - 6Q$$

   The monopolist picks (Q,P) such that MR = MC

   $150 - 4Q = 6 \rightarrow Q = 36 \rightarrow P = 78$. And profits are equal to $(78-6) \times 36 = 2592$. Therefore, each firm gets $72 \times 18 = 1296$.

   (b) Suppose that the firms independently choose quantities q_1 and q_2 once and for all, so $Q = q_1 + q_2$. Find quantities (and corresponding price and profits) so that neither firm has an incentive to change its quantity. (4pts)

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

   For firm 1: $150 - 4q_1 - 2q_2 = 6$ and for firm 2: $150 - 2q_1 - 4q_2 = 6$. The reaction function $r_2(q_1) = (144 - 2q_1)/4$ Solving for q_2, $-150 + 6q_2 = -6 \rightarrow q_2 = 144/6 = 24$ and $q_1 = 24$.

   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 q_1 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)

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

$\max_{q_1 \geq 0} \pi(q_1, r_2(q_1)) = (150 - 2q_1 + (6 - 150)/2 + q_1)q_1 - 6q_1$. The FOC is

$$(150 - 6)/2 - 2q_1 = 0 \rightarrow q_1 = 144/4 = 36$$

and q_2 satisfies (from the BR), $(150 - 6)/4 - 2 * 36/4 = q_2 \rightarrow q_2 = 18$

(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) *here, we have to compare the outcome of cournot agaisnt 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* $162 - 144/r < 0 \rightarrow r < 144/162$*.*