**HW 3 Solutions**

**Part 1: Chapter 7**

2)

* 1. The HHI is .



* 1. The four-firm concentration ratio is 100 percent.
  2. If the firms with sales of $200,000 and $400,000 were allowed to merge, the resulting HHIwould increase by 1,322 to 5,041. Since the pre-merger HHIexceeds that under the *Guidelines* (1,800) and the HHI increases by more than that permitted under the *Guidelines* (100), the merger is likely to be challenged.

3)

The elasticity of demand for a representative firm in the industry is –1.5, since 

4)

* 1. $100. To see this, solve the Lerner index formula for *P* .
  2. Since , it follows that the markup factor = 2.86. That is, the price charged by the firm is 2.86 times the marginal cost of producing the product.
  3. The above calculations suggest price competition is not very rigorous and that the firm enjoys market power.

17)



Table 7-1

Based on the Rothschild indices in Table 7-1, wholesale trade most closely resembles a monopoly, while finance most closely resembles perfect competition.

**Chapter 8**

4)

* 1. MR = 200 – 4Q and MC = 6Q. Setting MR = MC yields 200 – 4Q = 6Q. Solving yields Q = 20 units. The profit-maximizing price is obtained by plugging this into the demand equation to get P = 200 - 2(20) = $160.
  2. Revenues are R = ($160)(20) = $3200 and costs are C = 2000 + 3(20)2 = $3200, so the firm’s profits are zero.
  3. Elastic.
  4. TR is maximized when MR = 0. Setting MR = 0 yields 200 – 4Q = 0. Solving for Q yields Q = 50 units. The price at this output is P = 200 – 2(50) = $100.
  5. Using the results from part d, the firm’s maximum revenues are R = ($100)(50) = $5,000.
  6. Unit elastic.

7)

1. The inverse linear demand function is P = 10 – .5Q.
2. MR = 10 – Q and MC = –14 + 2Q. Setting MR = MC yields 10 – Q = –14 + 2Q. Solving for Q yields Q = 8 units. The optimal price is P = 10 – .5(8) = $6.
3. Revenues are R = ($6)(8) = $48. Costs are C = 104 – 14(8) + (8)2 = $56. Thus the firm earns a loss of $8. However, the firm should continue operating since it is covering variable costs.
4. In the long run exit will occur and the demand for this firm’s product will increase until it earns zero economic profits. Otherwise, the firm should exit the business in the long run.

17)

Your average variable cost of producing the 10,000 units is $600 (depreciation is a fixed cost). Since the price you have been offered ($650) exceeds your average variable cost ($600), you should accept the offer; doing so adds $50 per unit (for a total of $500,000) to your firm’s bottom line.

**Part 2**

2)

a) The main point here is that you want to make sure you are producing at a point where the marginal costs of both plants are equalized. We can do that in a number of ways. One way is by writing





Recall that *Q = QSJ + QSC* , so we have a system of 2 linear equations in 2 unknowns. The solution is (check by plugging back into the equations above)

 , which 

b) In order for you to give a proper recommendation to the owner we must compare the profits from running each plant while the other is closed. This means that you just solve the problem twice with one plant closed each time, so you use just one of the two simultaneous equations with *Q = QSJ* or *Q = QSC* . The solutions to these problems are:

When SJ is the only operating plant  

When SC is the only operating plant  

Therefore our conclusion should be to keep both plants open .

3)

Here you are asked to solve a 4 firm Cournot model. The set up is as follows:



Doing this for each firm will give you a set of 4 first order conditions representing your best response functions in the following form



Add these 4 equations for i=1,2,3,4 to get

400 –16 – 2*qT* – 3*qT* =0, where *qT* is the sum of all 4 *qi*’s.

Therefore *qT* =(400-16)/5 = 4\*96/5 = 76.8, and so p=23.2 in Cournot Nash equilibrium. Since the firms are identical, they each produce a quarter of the total output, so  .

The Bertrand model would have firms pricing at p=MC=4, so *qT* =96 and firm I produces *qi* =24. If firms have to choose integer prices, then p =5 with *qT* =95 is also an equilibrium of the model, since no firm can increase profit by choosing a different price.

Periods 1-5 of the class experiment have the firms choosing quantity, as in the Cournot oligopoly with 4 firms.

The data from periods 1-5 in industry 1 has average total output more than 100, so average price is negative. This is a price war with a vengeance! It is not at all close to the (one shot) Cournot prediction. In industry 2, average total output is 88.8, which falls between the Cournot prediction of 76.8 and the Bertrand prediction of 95 or 96.

The last 3 periods of the class experiment have the firms choose price, as in the Bertrand model. Although behavior varies quite a bit in the first of these periods, the data from both industry 1 and industry 2 agree precisely with the prediction p=5 in the last 2 periods.