**Perfect Competition**

1. Suppose that a competitive firm’s marginal cost of producing output q is given by . Assume that the market price of the firm’s product is $9.
2. What level of output will the firm produce?
3. What is the firm’s producer surplus?

1. Suppose that the average variable cost of the firm is given by . Suppose that the firm’s fixed costs are known to be $3. Will the firm be earning a positive, negative, or zero profit in the short run?
2. A firm produces a product in a competitive industry and has a total cost function

and a marginal cost function .

At the given market price of $20, the firm is producing 5 units of output. Is the firm maximizing its profit? What quantity of output should the firm produce in the long run?

**Monopoly**

1. Suppose that an industry is characterized as follows:

*C* = 100 + 2*q*2 each firm’s total cost function

*MC* = 4*q* firm’s marginal cost function

*P* = 90 − 2*Q* industry demand curve

*MR* = 90 − 4*Q* industry marginal revenue curve

1. If there is *only one firm* in the industry, find the monopoly price, quantity, and level of profit.
2. Find the price, quantity, and level of profit if the industry is competitive.

**Game Theory**

1. We can think of U.S. and Japanese trade policies as a prisoners’ dilemma. The two countries are considering policies to open or close their import markets. The payoff matrix is shown below.

|  |  | **Japan** | |
| --- | --- | --- | --- |
|  |  | **Open** | **Close** |
| **US** | **Open** | **10, 10** | **5, 5** |
| **Close** | **-100, 5** | **1, 1** |

Assume that each country knows the payoff matrix and believes that the other country will act in its own interest. Does either country have a dominant strategy? What will be the equilibrium policies if each country acts rationally to maximize its welfare?

1. BuyRight is a chain of grocery stores operating in small cities throughout the southwestern United States. BuyRight’s major competition comes from another chain, Acme Food Stores. Both firms are currently contemplating their advertising strategy for the region. The possible outcomes are illustrated by the payoff matrix below.

|  |  | **Acme Foods** | |
| --- | --- | --- | --- |
|  |  | **Increase Advertising** | **Don’t Increase Advertising** |
| **BuyRight** | **Increase Advertising** | **20, 15** | **35, -5** |
| **Don’t Increase Advertising** | **2, 30** | **25, 25** |

Entries in the payoff matrix are profits. BuyRight’s profit is before the comma, Acme’s is after

the comma.

1. Describe what is meant by a dominant strategy.
2. Given the payoff matrix above, does each firm have a dominant strategy?
3. Under what circumstances would there be no dominant strategy for one or both firms?
4. Consider two firms, X and Y, that produce super computers. Each can produce the next generation super computer for the military (M) or for civilian research (C). However, only one can successfully produce for both markets simultaneously. Also, if one produces M, the other might not be able to successfully produce M, because of the limited market. The following payoff matrix illustrates the problem.

|  |  | **Firm Y** | |
| --- | --- | --- | --- |
|  |  | **M** | **C** |
| **Firm X** | **M** | **2, 1** | **2, 2** |
| **C** | **1, 1** | **3, 2** |

Find the Nash equilibrium, and explain why it is a Nash equilibrium.

**Oligopoly**

1. **Consider two firms facing the demand curve *P*** = **50** − **5*Q*, where *Q*** = ***Q*1** + ***Q*2. The firms’ cost functions are *C*1(*Q*1)** = **20** + **10*Q*1 and *C*2(*Q*2)** = **10** + **12*Q*2.**
2. **Suppose both firms have entered the industry. What is the joint profit-maximizing level of output? How much will each firm produce?**
3. **What is each firm’s equilibrium output and profit if they behave noncooperatively? Use the Cournot model. Draw the firms’ reaction curves and show the equilibrium.**