# Due: Thursday, July 25 (in class)

**Question 1:** A monopolist can produce at constant average and marginal costs of $AC = MC = 5$. The firm faces a market demand curve given by $Q = 53 - P$.

1. Calculate the profit-maximizing price-quantity combination for the monopolist. Also calculate the monopolist's profits.

2. What output level would be produced by this industry under perfect competition?

3. Calculate the consumer surplus obtained by consumers in part (2). Show that this exceeds the sum of the monopolist's profits and the consumer surplus received in part (1).

**Question 2:** Suppose that a monopoly can produce any level of output it wishes at a constant marginal and average cost of \$5 per unit. Assume the monopoly sells its goods in two different markets separated by some distance. The demand curve in the first market is given by $Q_1 = 55 - p_1$, and the demand curve in the second market is given by $Q_2 = 70 - 2p_2$.

1. If the monopolist can maintain the separation between the two markets, what level of output should be produced in each market, and what price will prevail in each market? What are total profits in this situation?

2. How would your answer change if the firm was forced to follow a single-price policy?

3. How would your answer change if it only costs \$5 to transport goods between the two markets? What would be the monopolist's new profit level in this situation?

4. Suppose the firm adopts a linear two-part tariff pricing policy to implement second-degree price discrimination, should the firm serve both markets? If it is better to serve only one market, which one? Show your work.

**Question 3:** Solve for the Nash Equilibrium for the following 2-by-2 game.

| | | **White Sox** | |
|---|---|---|---|
| | | *Confess* | *Deny* |
| **Cubs** | *Confess* | $-3, -3$ | $0, -6$ |
| | *Deny* | $-6, 0$ | $-1, -1$ |

**Question 4:** There is a **STOP** (State Law: Yield to Pedestrians) sign in the middle of the street between Gerdin business school and the parking lot at Iowa State. When school is in session, many students cross that street to attend classes either in Gerdin or East/Heady hall. The problem is that there are always some arrogant drivers who instead of coming to a full stop yielding to students crossing the street required by Iowa state law, like to speed up when approaching to the stop sign in order to scare away pedestrians. We can model this real world situation using game theory. Suppose there are two players, a driver and a pedestrian. Driver has two strategies to choose: yield to pedestrian (Yield) or accelerate to run over that pedestrian (Accelerate). The pedestrian has two strategies too: stop to let the car pass by though she has the right of way (Stop) or stand up for your right keeping crossing the street ignoring the incoming car (Cross). Solve for Nash Equilibrium of the following 2-by-2 game based on the pay-off table.

| | | **Driver** | |
|---|---|---|---|
| | | *Accelerate* | *Yield* |
| **Pedestrian** | *Cross* | $-50, -50$ | $20, -10$ |
| | *Stop* | $-10, 20$ | $0, 0$ |

**Question 5:** Solve for the Nash Equilibrium for the following 4-by-4 game:

| | | | **Paul** | | |
|---|---|---|---|---|---|
| | | *Montreal* | *NYC* | *Toronto* | *Boston* |
| | *Montreal* | 2, 3 | 0, 0 | 5, 1 | 1, 2 |
| **John** | *NYC* | -1, 6 | 2, 3 | 10, 4 | 8, 4 |
| | *Toronto* | 0, 0 | 3, 1 | 8, 3 | 2, 1 |
| | *Boston* | 1, 9 | -1, 9 | 3, 9 | 0, 9 |