**Homework #4: Profit Maximization for a price-making firm**

**Economics 4320: Intermediate Microeconomics**

**Please submit using Blackboard drop box.**

**NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

# Problems

1. **(Demand Estimation and Profit Maximization).**

**See Lectures 3 and 16**

You run a firm that sells custom t-shirts over the Internet. You want to work out the price you should charge to maximize profits. To do this, you decide to run a market experiment. You lower your price from your standard price of $22 to $20.

When you do this, your weekly sales increase from 4,400 t-shirts per week to 4,800 t-shirts per week.

* 1. (3 points) Assuming that your firm’s demand function is linear (i.e., $Q\left(P\right)=a-bP$), estimate your demand function.
	2. (3 points) You have fixed costs of $7,800 per week and variable costs of $10 per t-shirt. What is your firm’s cost function?
	3. (3 points) What is your firm’s profit function?
	4. (3 points) Calculate the profit maximizing quantity, $Q^{\*}$, that your firm should produce
	5. (3 points) Calculate the profit maximizing price that your firm should charge
	6. (3 points) Calculate profits at the profit maximizing price
	7. (3 points) Calculate profits at your original price of $22. Is this higher or lower than profits at the profit maximizing price? Is this what you would expect?
1. **(18 points) Profit Maximization**

**See Lectures 7 and 16**

Your firm faces the following demand curve:

$$Q\left(P\right)=\frac{186,624}{P^{2}}$$

 Your firm’s cost function is:

$$TC\left(Q\right)=27Q$$

1. **(3 points) Calculate the price elasticity of demand (as a function of price)**
2. **(3 points) Calculate the profit function**
3. **(3 points) Calculate the profit maximizing quantity Q\***
4. **(3 points) Calculate the profit maximizing price P\***
5. **(3 points) Calculate profits at the profit maximizing price and quantity**
6. **(3 points) Calculate the markup on price at the profit maximizing price**

**Note:** $Markup on Price=\frac{P-MC}{P}$

**Hint: Calculate the marginal cost by taking the derivative of the cost function**

1. **(18 points) Profit Maximization**

**See Lectures 7 and 16**

Your firm faces the following demand curve:

$$Q\left(P\right)=\frac{4,251,528}{P^{3}}$$

 Your firm’s cost function is:

$$TC\left(Q\right)=27Q$$

1. **(3 points) Calculate the price elasticity of demand (as a function of price)**
2. **(3 points) Calculate the profit function**
3. **(3 points) Calculate the profit maximizing quantity Q\***
4. **(3 points) Calculate the profit maximizing price P\***
5. **(3 points) Calculate profits at the profit maximizing price and quantity**
6. **(3 points) Calculate the markup on price at the profit maximizing price**

**Note:** $Markup on Price=\frac{P-MC}{P}$

**Hint: Calculate the marginal cost by taking the derivative of the cost function**