**2.3: Applications of Quadratics to Business**

**Math 111**

**Part 1: Profit, Revenue, and Cost**

Question: What is the difference between a competitive and monopoly market?

***Monopoly Market***

* How to find the revenue function:

**Revenue = (selling price).(quantity sold)**

Section 1.6: *Competitive market (linear revenue)*

The business does not control price. Instead, price is based on competitors’ price.

Ex: If the selling price is  per unit, .

Section 2.3: *Monopoly market (quadratic revenue)*

The business has control over price and using marketing /research can develop a price function that helps them set the right price. This is sometimes called the “demand equation”.

Ex: If the selling price is  per unit, .

* How to find the cost function:

**Variable cost**

**Costs = fixed cost + (cost).(quantity produced)**

Section 1.6: Variable cost was a constant price per unit, so the cost function was linear.

Ex: If the fixed cost is  and variable cost is, .

Section 2.3: Variable cost is not always a constant price per unit, so the cost function could be quadratic.

Ex: If the fixed cost is  and the variable cost is  per unit, 

Ex1: In a monopoly market, the demand for a product is given by $385-0.20x$. Fixed costs are $\$13,500$ and variable costs are $40+0.80x$ dollars per unit.

1. Find the revenue and cost functions.
2. Find and interpret the max revenue and the number of units that must be sold to get it.
3. Find and interpret the break-even points.
4. Find the number of units that have to be sold to maximize profit and the maximum profit.
5. What is the selling price that maximizes the profit.

Ex2: The total costs for a company are given by and the total revenue is given by .

1. What type of a market is this?
2. What is the profit function?
3. Find and interpret the break-even point.
4. Find and interpret the maximum profit and the number of units that needs to be produced and sold to maximize the profit.
5. Sketch the graph.

**Part II: Supply and Demand**

Ex3: Find and interpret the equilibrium point if the supply for a certain product is given by  and the demand by  .

Ex3 revisited: Find and interpret the equilibrium point if a tax of $12.50 per item is placed onto suppliers and then passed onto consumers. Before the tax the supply for the product is given by  and the demand by  .