Section 2.3: Business Applications of Quadratic Functions

Supply, Demand and Market Equilibrium
SAME as Sec.1.6. In this section, functions can be non-linear.

Ex.1 (#6) If the supply function for a commodity is \( p = q^2 + 8q + 20 \) and the demand function is \( p = 100 - 4q - q^2 \), find the equilibrium quantity and equilibrium price.

Ex.2 (#12) The supply and demand for a product are given by \( 2p - q = 50 \) and \( pq = 100 + 20q \), respectively. Find the market equilibrium point.
Ex.3 (#14) For the product in Example 2, if a $12.50 tax is placed on production and passed through by the supplier, find the new equilibrium point.

**Break-Even Points and Maximization**

Recall: Break-even point: \( C=R \), or \( P=0 \)

* In a monopoly market, the revenue of a company is determined by the demand for the product such as

\[
R = px = [f(x)]x,
\]

where \( p = f(x) \) is the demand function and \( x \) is the number of units sold.

* If a function of revenue (or profit) is quadratic, then the maximum revenue (or maximum profit) occurs at the vertex of the function.
Ex.4 (p.164-166) Suppose that in a monopoly market the total cost per week of producing a high-tech product is given by $C = 3600 + 100x + 2x^2$. Suppose further that the weekly demand function for this product is $p = 500 - 2x$.

(a) Find the number of units that will give the break-even point for the product.

(b) Find the maximum revenue.

(c) Find the maximum profit.