Exam 2 – Practice 3 Math 110.

Exam Guidelines This is an in-class, written exam with a 75-minute time limit.

- **Permitted Materials:** You may use a basic calculator and formula sheets.
- **Formula Sheet Restrictions:** Your sheets must contain formulas only; no examples or worked problems are permitted. All sheets will be inspected at the start of the exam.
- **Prohibited Items:** Phones and all other smart devices are strictly forbidden.
- **Academic Integrity:** The use of AI is prohibited. Any AI usage will result in an automatic F for the exam and may lead to failing the entire course.
- Show **ALL** your work for credits.

1. Solve each quadratic by factoring or the quadratic formula.
   a. $x^2 = 4$

   b. $2x^2 - 12x + 18 = 0$

   c. $-3x^2 - 6x + 9 = 0$

   d. $x^2 + 3x = 2x + 6$

2. Graph of the quadratic functions. Label the vertex and another point.
   a. $y = x^2 + 4x + 3$

b. $y = -x^2 + 6x + 4$

3. Suppose that in a monopoly market the total cost per week of producing a high-tech product is given by $C = 1800 + 80q + q^2$. Suppose further that the sales price function for this product is
$p = 260 - 2q$.

   a. Find the revenue function in term of q.

   b. Find the number of units that will **maximize the revenue.**

   c. Find the profit function

   d. Find the number of units that will give **break-even** for the product

   e. Find **the maximum profit** and the number of products need to maximize the profit.

f. Graph the revenue function and the cost function label the break-even points, fixed cost, and the maximized profit point.

4. On a certain route, an airline carries 5000 passengers per month, each paying $30. A market survey indicates that for each $1 increase in the ticket price, the airline will lose 80 passengers.

   a. What is the airline's current revenue?

   b. Create an income (revenue) function if "x" is defined as the number of $1 price increases

   c. Find the number of $1 price increases that will maximize the revenue.

   d. Find the new ticket price (that will maximize the revenue)

   e. Find the number of passengers at that price in d.

   f. Find the new maximum income (income at that price in d)

5. If the supply function for a commodity is given by $p = 5q^2 + 10q$ and the demand function is given by $p = 200 - 5q^2$, find the point of market equilibrium (Supply equals Demands).