Math 2200   **Maximum/Minimum Problems**

1. Two numbers have a difference of 8. Find the numbers if their product is a minimum.

2. The sum of two numbers is 12. If their product is a maximum, find the numbers.

3. Two numbers differ by 20. Find the numbers if the sum of their squares is a minimum.

4. On a forward somersault , Greg's height above the water is given by
    $h = -5t^2 + 6t + 3$, where t is time in seconds and h is height in meters.

    (A) Find Greg's maximum height above the water.

    (B) How long does it take him to reach that maximum height?

    (C) How high is the diving board?

    (D) What is his height after 1.5 seconds?

5. The power P watts supplied to a circuit by a 9 volt battery is given by the formula
    $P = 9I - 0.5I^2$ where I is the current in amperes.

    (A) For what value of the current will the power be a maximum?

    (B) What is the maximum power?

6. A rectangular lot is bounded on one side by a river and on the other three sides by 80 m of fencing. Find the dimensions that will enclose the maximum area.

7. A lifeguard marks off a rectangular swimming area at a lake with 200 m of rope. She then divides the swimming area into three sections for beginner, intermediate and advanced swimmers. What is the greatest area she can enclose?

8. 80 m of fencing are available to enclose a rectangular play area. What dimensions will yield the maximum area? What is the maximum area?

9. A producer of synfuel from coal estimates that the cost C dollars per barrel for a production run of x thousand barrels is given by $C = 9x^2 - 180x + 940$. How many thousand barrels should be produced each run to keep the cost per barrel at a minimum? What is the minimum cost per barrel of synfuel?

10. Two numbers have a difference of 24. Find the numbers if the result of adding their sum and their product is a minimum.

11. A local restaurant averages 200 customers per day who spend $30 per meal. The manager estimates a loss of 10 customers per day for each $3 increase in meal price. If the average cost to prepare each meal is $12, write a quadratic function to model the daily profit and use it to determine the meal price that will maximize the profit.