Group Work Four **MATH 104** Name:_____

WORK ON THIS ASSIGNMENT IN GROUP OF 2-4. TURN IN YOUR WORK INDIVIDUALLY IN CLASS. YOU CAN USE YOUR NOTES FOR THIS ASSIGNMENT.

Sections 3.1 3.2, 3.3, 3.4, 3.5 and 3.6

1. Perform the following operations and express the result as a simplified (in standard form $a + bi$) complex number.

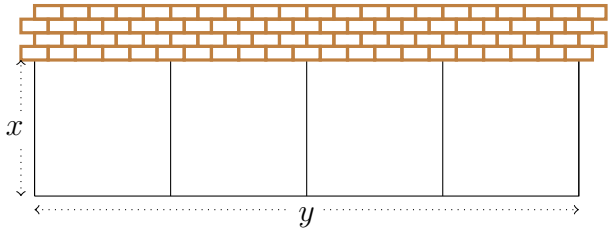
   (a) $(8 + 7i) + (9 - 5i) =$

   (b) $(9 + 5i) - (1 - i) =$

   (c) $(8 + 7i) \cdot (9 + 5i) =$

   (d) $\dfrac{8 + 7i}{3 + 4i} =$

2. You are constructing a garden, against a wall, which will be separated into 4 plots as shown, where x and y are the width and length of the garden in yards:



You will surround three free sides of the garden by a fence, and separate the plots with fencing material. You have 100 yards of fencing material to use.

(a) Express the dimension y as a function of x.

(b) Find a function that models the area of the garden as a function of x.

(c) What are the dimensions, x and y, that will maximize the area of the garden? And what is the maximum area?

3. Lyle's Lemonade Stand sells glasses of lemonade at baseball games for \$1 a glass. At that price he sells 500 glasses of lemonade a game. He's noticed that for every 5 cents He raises the price, he sells 10 fewer glasses. Let x be the **number of times** Lyle **raises** the price by 5 cents.

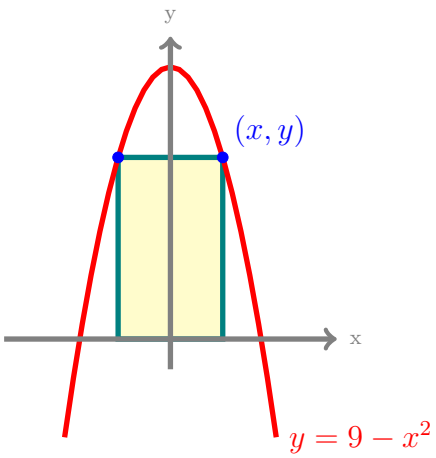
   (a) What is the number of glasses sold in terms of a function of x? What is the price of each glass in terms of a function of x?

   (b) Express the revenue as a function of x.

   (c) What is the **maximum revenue**? At what **price** is the maximum revenue is earned?

4. Let $f(x) = x^2 - 7x - 25$. Find average rate of change in f on interval $[a, a+h]$ and simplify. (This is also called the **difference quotient** for $f(x)$.)

5. A rectangle is to be inscribed in a region bounded by $y = 9 - x^2$ and x-axis in the upper half of the plane as shown below. Express the **area** of the rectangle as a function of x. What is the domain of such function?



6. (a) Find a polynomial with **integer coefficients** of degree 5 with zeros $2/5$, -2 and 5 of multiplicities 2,1 and 2 respectively.

(b) List all possible **rational** zeros of $P(x) = 2x^3 - x - 1$.

(c) Which of the possible zeros in Part (b) is a zero of the polynomial $p(x)$?

(d) Factor $p(x)$ into linear or quadratic polynomials with real coefficients.