Homework Assessment for p.315 Problems

5. A rectangular field with area $5000m^2$ is enclosed by 300m of fencing. Find the dimensions of the enclosure.

The Discriminant

What are the different types of solutions of the Quadratic Formula?

2 Real Solutions

$3, -11$

$\frac{3 \pm 2\sqrt{5}}{4}$

2 Imaginary Solutions

$\frac{2 \pm 3i}{5}$

1 Real Solution ← most rare

$\frac{2}{3}$

What has to happen for there to only be 1 real solution from the quadratic forumla?

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a + 0 = a$

$a - 0 = a$

by adding + subtracting zero, we only get 1 solution.

the stuff under the radical must equal zero.

What has to happen for our solutions to be imaginary?

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

to get imaginary what's underneath the radical must be negative.

We can see that the part that effects the type of root is what is under the radical. This has a special name.
THE DISCRIMINANT!

Discriminant Rules

D= $b^2 - 4ac$

2 Real Solutions: $D > 0$

2 Imaginary Solutions: $D < 0$

1 Real Solution: $D = 0$

$$4x^2 + \frac{3}{5}x = 1$$

$$5\left(4x^2 + \frac{3}{5}x - 1\right) = 0$$

$$20x^2 + 3x - 5 = 0$$

$$a = 20 \quad b = 3 \quad c = -5$$

$$D = b^2 - 4ac$$

$$D = 3^2 - 4(20)(-5)$$

$$D = 9 + 4 \cdot 20 \cdot 5$$

$$D > 0$$

2 Real solutions

$2x^2 - 2\sqrt{5} \cdot x + 4 = 0$

$a = 2 \quad b = -2\sqrt{5} \quad c = 4$

$D = b^2 - 4ac$

$D = (-2\sqrt{5})^2 - 4(2)(4)$

$D = 4 \cdot 5 - 32$

$D = 20 - 32 = -12$

2 imaginary roots