Unit 8 Day 12 Notes on Quadratics Formula and Discriminant

Key

Let's solve a few quadratic equations and think about the consequences

$x^2+7x-9=0$ $(7)^2-4(1)(-9)=85$

$x=\frac{-7\pm\sqrt{85}}{2}$ → $\frac{-7+\sqrt{85}}{2}=1.110$

↓ $\frac{-7-\sqrt{85}}{2}=-8.110$

$x^2+4x+4=0$ $(4)^2-4(1)(4)=0$

$x=\frac{-4\pm\sqrt{0}}{2}=\frac{-4}{2}=-2$

$x^2+4x+6=0$ $(4)^2-4(1)(6)=-8$

$x=\frac{-4\pm\sqrt{-8}}{2}$ ✱ no solution

Let's compare the number of solutions:

2 solutions | 1 solution | No solution

Why?

$\sqrt{\text{positive}}$ | $\sqrt{0}$ | $\sqrt{\text{negative}}$

What mattered was b^2-4ac We call this the discriminant

Determine the value of the discriminant and state what that means in terms of the number of solutions the equation has

$x^2-6x+9=0$

$d=(-6)^2-4(1)(9)$

$d=0$

1 solution

$x^2-6x-8=0$

$d=(-6)^2-4(1)(-8)$

$d=68$

2 solutions

$x^2-6x+12=0$

$d=(-6)^2-4(1)(12)$

$d=-12$

No solution

Summary:

$b^2-4ac=0$ ✱ 1 solution

$b^2-4ac>0$ ✱ 2 solutions

$b^2-4ac<0$ ✱ No solution

One more thing.

If the discriminant is a perfect square: b^2-4ac = perfect square $(1,4,9,16,25,36,\ldots)$

the the solutions will be rational

so it would be factorable

EX: $\frac{5\pm\sqrt{81}}{2}$ ☺