

The General Quadratic Formula

May 6/2010

Try solving these:

1. $x^2 - 4x - 5 = 0$

$$(x-5)(x+1) = 0$$

$$\boxed{x=5} \text{ or } \boxed{x=-1}$$

S: -4

P: -5

I: -5, +1

2. $x^2 - 4x - 7 = 0$

S: -4

P: -7

I: no integers

Apr 22-8:57 PM

The Quadratic Formula

If $ax^2 + bx + c = 0$, and $a \neq 0$
 (note: must be in standard form)

then

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

See p. 397
for derivation

The ' \pm ' symbol means there are two solutions.

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

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

Apr 22-9:06 PM

Try again: $x^2 - 4x - 7 = 0$

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

$$\begin{aligned} a &= 1 \\ b &= -4 \\ c &= -7 \end{aligned}$$

$$x = \frac{4 \pm \sqrt{16 - 4(1)(-7)}}{2}$$

$$x = \frac{4 \pm \sqrt{16 + 28}}{2}$$

$$x = \frac{4 \pm \sqrt{44}}{2}$$

$$x = \frac{4 + \sqrt{44}}{2} \quad \text{or} \quad x = \frac{4 - \sqrt{44}}{2}$$

$$x \approx 5.3$$

$$x \approx -1.3$$

x^2	$-2x$
$-2x$	$+4$

$$\begin{array}{r} -7 \\ -4 \\ \hline -11 \end{array}$$

$$y = (x-2)^2 - 11$$

Apr 22-9:21 PM

The quadratic formula can be used to solve any quadratic equation that has a solution. Thus we could also use it on our first example, but it will be much slower!

$$x^2 - 4x - 5 = 0$$

A perfect square under the root tells us that regular factoring would have worked.

Apr 22-9:22 PM

Try: $x^2 - 4x + 5 = 0$

$a = 1$

$b = -4$

$c = 5$

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

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(5)}}{2(1)}$$

$$= \frac{4 \pm \sqrt{16 - 20}}{2}$$

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

\therefore no solutions

A negative sign under the root cannot be evaluated, so there are no solutions to this equation.

Apr 22-9:26 PM

$$-5x^2 + 15x = 11$$

$$-11 \quad -11$$

$$-5x^2 + 15x - 11 = 0$$

$a = -5$

$b = 15$

$c = -11$

$$x = \frac{-15 \pm \sqrt{15^2 - 4(-5)(-11)}}{2(-5)}$$

$$= \frac{-15 \pm \sqrt{225 - 220}}{-10}$$

$$= \frac{-15 \pm \sqrt{5}}{-10}$$

$$x = \frac{-15 + \sqrt{5}}{-10}$$

$$\text{or } x = \frac{-15 - \sqrt{5}}{-10}$$

$$x \approx 1.28$$

$$x \approx 1.72$$

$$x = 1.28 \text{ or } x = 1.72$$

Apr 22-9:27 PM

Assigned Work:

p. 403 # 4, 6, 11

Nov 14 - 11:15 PM