

11/26/12

Completing the Square

Solve by "Completing the Square"

Example

1 $x^2 + 8 = 4x$ $a = 1$ $b = -4$ $c = 8$

Standard form for a quadratic.

$x^2 - 4x + 8 = 0$

$(\frac{b}{2a})^2 \rightarrow (\frac{-4}{2(1)})^2 \rightarrow (-2)^2 \rightarrow 4$

get c over

$x^2 - 4x = -8$

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

~~$\begin{array}{c} 4 \\ -\frac{2}{x} \end{array} \quad \begin{array}{c} -2 \\ x \\ -4 \end{array}$~~

$(x-2)(x-2) = -4$

$(x-2)^2 = -4$

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

$x-2 = \pm 2i$

$x = 2 \pm 2i$

Example

2 $y^2 - 3y - 5 = 0$ $a = 1$ $b = -3$ $c = 0$

$y^2 - 3y = 5$

$(\frac{b}{2a})^2 \rightarrow (\frac{-3}{2(1)})^2 \rightarrow (\frac{-3}{2})^2 \rightarrow \frac{9}{4}$

$y^2 - 3y + \frac{9}{4} = \frac{29}{4}$

$(y - \frac{3}{2})^2 = \frac{29}{4}$

Shortcut!

$\sqrt{(y - \frac{3}{2})^2} = \sqrt{\frac{29}{4}}$

$y - \frac{3}{2} = \pm \frac{\sqrt{29}}{2}$

$y = \frac{3}{2} \pm \frac{\sqrt{29}}{2}$

1/2 Example

3 $\frac{3x^2}{3} + \frac{12x}{3} + \frac{1}{3} = \frac{0}{3}$

$x^2 + 4x + \frac{1}{3} = 0$

If "a" is not 1, divide everything by "a", then solve normally.