BE-Alg.1 Monday 2-21-11

① $\sqrt{25} = ?$ ③

② $\pm\sqrt{81} = ?$ ④

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⑤ Solve: $x^2 = 49$

⑥ Solve: $(x+3)^2 = 4$

Solution

⑤ $x^2 = 49$

$\sqrt{x^2} = \pm\sqrt{49}$

$\boxed{x = \pm 7}$

CK $+7$: $(\ )^2 \stackrel{?}{=} 49$

$(7)^2 \stackrel{?}{=} 49$ ✓

CK -7: $(\ )^2 \stackrel{?}{=} 49$

$(-7)^2 = 49$ ✓

⑥ $(x+3)^2 = 4$

$\sqrt{(x+3)^2} = \pm\sqrt{4}$

$x+3 = \pm 2$

$x = -3 \pm 2$

$\boxed{x = \{-1, -5\}}$

CK $x=-1$: $(-1+3)^2 \stackrel{?}{=} 4$ ✓

CK $x=-1$: $(-5+3)^2 \stackrel{?}{=} 4$ ✓

Note: $(x+3)^2 = x^2+6x+9$

Look at $(x+3)^2 = 4$

$(x+3)(x+3) = 4$

$x^2 + 6x + 9 = 4$

$\downarrow \quad \downarrow \quad \downarrow$

$a^2 + 2ab + b^2$

or $a^2 + \underline{\underline{2b}}(a) + b^2$

Take $\frac{1}{2}$ of the coefficient of the middle term and square it.

* IFF the coefficient of a^2 is 1 (if and only if

This leads to the basic method of solving $ax^2+bx+c=0$, the quadratic equation, when a is ~~not~~ a perfect square but is positive $\Rightarrow$

Completing the Square = solving $ax^2+bx+c=0$ when it cannot be factored.

(Ex) $x^2 + 6x + 2 = 0$

$-2 \quad -2$

$x^2 + 6x + \{\square\} = -2$

$b^2 - 4ac$

$(6)^2 - 4(1)(2)$

$36 - 8 = \boxed{28 = d}$

2 real roots, irrational.

↑ take $\frac{1}{2}$ of 6 and square it, add to both sides. $\Rightarrow \frac{6}{2} = 3, \; 3^2 = 9$

$x^2 + 6x \{+9\} = -2 + 9$

$a^2 + 2ab + b^2$

$(x+3)^2 = 7$

$\sqrt{(x+3)^2} = 7$

$x + 3 = \pm\sqrt{7}$

$x = -3 \pm \sqrt{7}$ $\quad \boxed{x = \{-3+\sqrt{7}, -3-\sqrt{7}\}}$

$x = -3 + \sqrt{7}$

$x = -3 + 2.65$

$x = -.35$

$x = -3 - \sqrt{7}$

$x = -3 - 2.65$

$x = -5.65$

$\boxed{x \cong \{-.35, -5.65\}}$

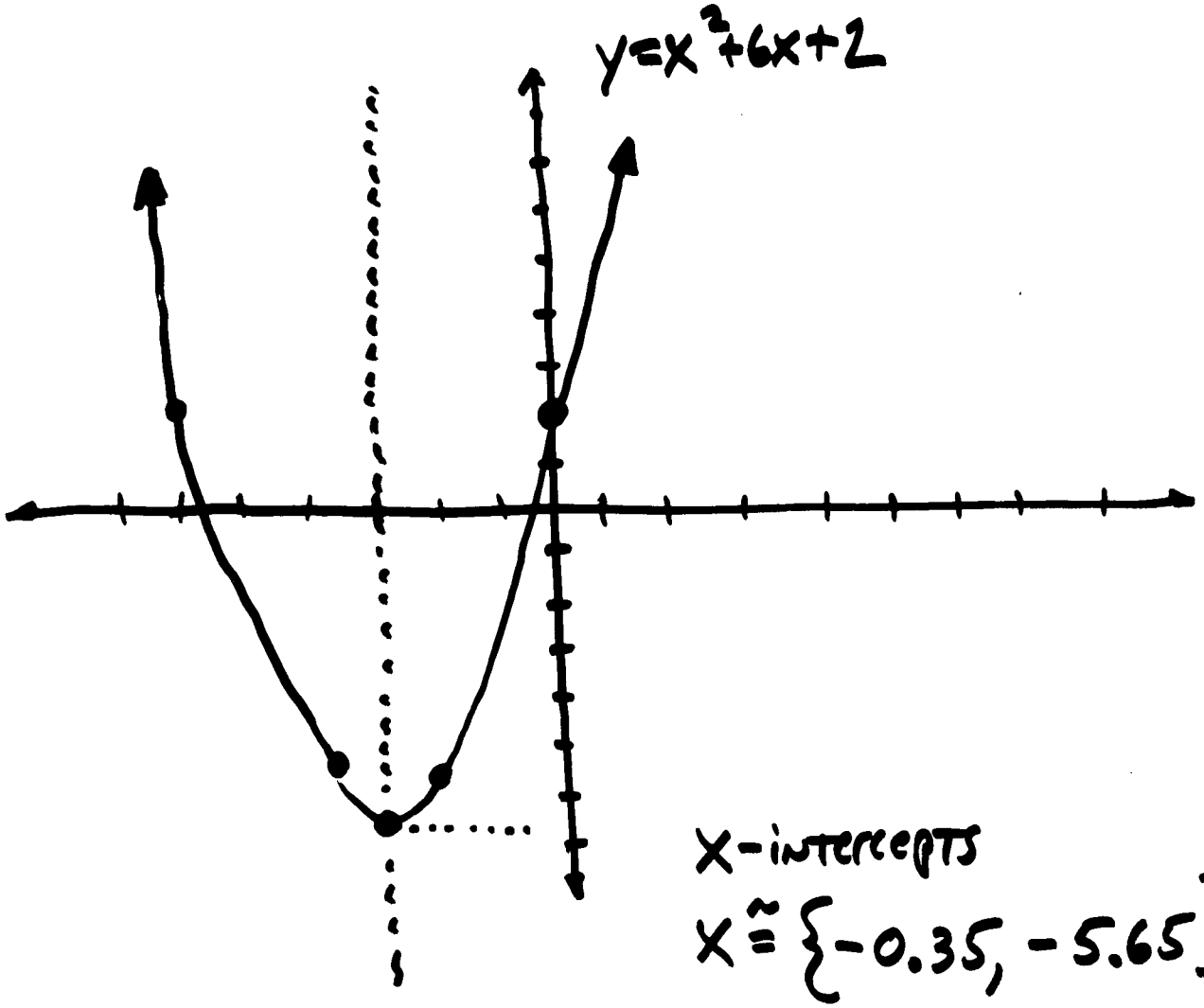
Look at the graph of

$x^2 + 6x + 2 = y$

$x = Axis = \frac{-b}{2a}$

$x = \frac{-6}{2} = -3$

x	y
V -3	9 - 18 + 2 = -7
0	2
-2	4 - 12 + 2 = -6



x-intercepts

$x \approx \{-0.35, -5.65\}$

Ch. 10-3 Completing The Square

CTS is "the biggie", it can be used TO SOLVE ANY QE.

EX3 Pg540

Solve

$$a^2 - 14a + 3 = -10$$
$$-3 \quad -3$$

$$a^2 - 14a + \square = -13$$

↑ TAKE $\frac{-14}{2}$ AND SQUARE

$$a^2 - 14a + 49 = -13 + 49$$

$$(a-7)^2 = 36$$

$$\sqrt{(a-7)^2} = \pm\sqrt{36}$$

$$a - 7 = \pm 6$$

$$a = 7 \pm 6$$

$$\boxed{a = \{13, 1\}}$$

↑ RATIONAL, YOU COULD FACTOR $a^2 - 14a + 13 = 0$

Recall, the rule of "take $\frac{1}{2}$ of the coefficient of the middle term and square it" only works if "$a=1$", WHAT IF IT IS NOT?

(Ex) $2x^2 - 5x + 8 = 7$

÷ everything by a

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

$$x^2 - \frac{5}{2}x + \left(\frac{5}{4}\right)^2 = -\frac{1}{2} + \frac{25}{16}$$

$$\left(x - \frac{5}{4}\right)^2 = -\frac{8}{16} + \frac{25}{16} = \frac{17}{16}$$

$$x - \frac{5}{4} = \pm\sqrt{\frac{17}{16}}$$

$$\boxed{x = +\frac{5}{4} \pm \sqrt{\frac{17}{16}}}$$

$x = +1.25 + \sqrt{\frac{17}{16}}$

$x = +1.25 + 1.03$

$\boxed{x = 2.28}$

$x = +1.25 - \sqrt{\frac{17}{16}}$

$x = +1.25 - 1.03$

$\boxed{x = 0.22}$

Homework:

Solve by "CTS"

1. $x^2 - 4x + 4 = 9$
2. $x^2 + 10x + 25 = 11$
3. $x^2 - 8x + 5 = 0$
4. $2x^2 - x - 9 = 0$

÷ by 2 before CTS

Answers

1. $x = \{-1, 5\}$
2. $x = \{-5 \pm \sqrt{11}\} \cong \{-1.68, -8.32\}$
3. $x = \{4 \pm \sqrt{11}\} \cong \{0.68, 7.32\}$
4. $x = \left\{\frac{1}{4} \pm \sqrt{\frac{73}{16}}\right\} \cong \{-1.89, 2.39\}$