Class #13 Thurs, Sept. 30

Today:

- hand in Quiz #2 (due tonight)

$\underbrace{\hspace{6em}}$ Blackboard

(reminders: Tues class and/or yesterday office hrs)

- review/recap "Zero Product Prop"
- (solving quadratic eqn. $ax^2 + bx + c = 0$ via factoring the LHS).
- next topic: solving quadratic eqns via the "square root property" and "completing the square"

Review

Solving a quadratic eqn via factoring (and ZPP)

Ex (6.45 in textbook)

Solve : $2y^2 = 13y + 45$

1. "Move everything" to LHS, make RHS 0

$2y^2 - 13y - 45 = 0$

"quadratic eqn in standard form $ax^2 + bx + c = 0$"

$a = 2, \quad b = -13, \quad c = -45$

2. Factor LHS using ac-method :

② Factor LHS using the ac-method:

$$2y^2 - 13y - 45 = 0$$

2 factors of $ac = (2)(-45) = -90$ which sum to $b = -13$

$$\underbrace{[2y^2 - 18y]}_{\text{GCF}: 2y} + \underbrace{[5y - 45]}_{\text{GCF}: 5} = 0$$

$$2y[y-9] + 5[y-9] = 0$$

$$\Rightarrow (y-9)(2y+5) = 0$$

use -18 and $+5$ (in order to "split the linear term" in the quadratic)

By Zero Product Property:

$y - 9 = 0$ or $2y + 5 = 0$

$\boxed{y = 9}$

$2y = -5$

$\boxed{y = -\frac{5}{2}}$

[my strategy when $ac < 0$: look for 2 factors of $+90$ which differ by 13

factors of 90

1, 90

2, 45

3, 30

5, 18

<u>Last step</u>: check our solutions (by <u>plugging</u> into the original equation):

$$2y^2 = 13y + 45$$

<u>$y = 9$</u>:

$$2(9^2) \stackrel{?}{=} 13(9) + 45$$

$$2(81) \stackrel{?}{=} 117 + 45$$

$$162 = 162 \checkmark$$

$$\begin{array}{r} \overset{1}{1}17 \\ +\ 45 \\ \hline 162 \end{array} \checkmark$$

<u>$y = -\frac{5}{2}$</u>:

$$2\left(\left(-\frac{5}{2}\right)^2\right) \stackrel{?}{=} \frac{13}{1}\left(-\frac{5}{2}\right) + 45$$

$$\cancel{2}\left(\frac{25}{\cancel{4}\,2}\right) \stackrel{?}{=} -\frac{65}{2} + \frac{90}{2}$$

$$\frac{25}{2} \stackrel{?}{=} \frac{-65+90}{2}$$

$$\frac{25}{2} = \frac{25}{2} \checkmark$$

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

"SRP"

<u>Next topic</u> : Using the "square root property"

§9.1 (to solve certain types of quadratic equations).

<u>Ex</u> : WW, "SRP" #1

$x^2 = 121$

By square root prop:

$x = 11$, $x = -11$

(ie., $x = \pm 11$)

(in std form:

$\underbrace{x^2 - 121}_{\text{factor!}} = 0$

since $121 = 11^2$

$(x+11)(x-11) = 0$

$x + 11 = 0$ $\quad$ $x - 11 = 0$

zero product property $\Rightarrow$ solutions are:

$x = -11$, $x = 11$

shorthand notation: $x = \pm 11$

Square Root Property :

Solutions of the quadratic equation

$x^2 = k$ (where RHS k is a constant #)

are :

the "positive" square root and the "negative" square root

$x = \sqrt{k}$ or $x = -\sqrt{k}$

(we use the notation $\underline{x = \pm\sqrt{k}}$)

note: negative sign is outside the square root!

Ex: Solve

$$x^2 = 40$$

Solutions : $x = \pm\sqrt{40}$

$x = \sqrt{40} = 2\sqrt{10}$, $x = -\sqrt{40} = -2\sqrt{10}$