Class #12 — Tues, Sept. 28

Last week : factoring quadratics $(ax^2 + bx + c)$

- "ac-method"
- "differences of squares"

$$x^2 - \boxed{b^2} = (x+b)(x-b)$$

↑
constant
term.

(see Class Notes/recordings from last Thus/ Fri).

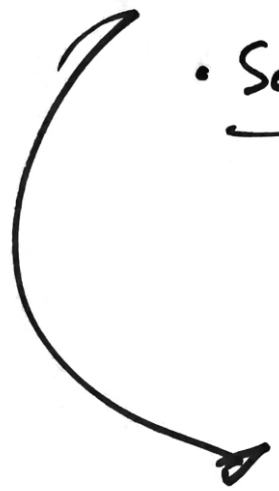Office hrs — notes/recording — yesterday
(Mon Sept. 27)

Today :

- Solve quadratic equations. :

$$ax^2 + bx + c = 0$$

⎵ quadratic
polynomial.

$\Big\}$ ie.. we want to find the value(s) of x for which the given quadratic is equal to 0.

— solve by factoring the LHS and applying the "Zero Product Property".

Thus + Fri : Solving quadratic equations by

- "completing the square"
- quadratic formula
$$ax^2 + bx + c = 0 \quad \text{for} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

WW, "ZPP" #4 :

Solve : $1x^2 - 12x + 27 = 0$

$b = -12$ $c = 27$

$\begin{cases} \text{2 factors} \\ \text{of } ac = +27 \\ \text{which sum} \\ \text{to } b = -12 \end{cases}$

factor LHS

$$(x - 3) \cdot (x - 9) = 0$$

27	+
1, 27	
(-3, -9)	-12

We have transformed/simplified the given quadratic equation by factoring:

So we need to find the values of x for which "$(x-3)(x-9)$" equals 0 !

product of 2 #s.

Ex: $x = 1$? $(x-3)(x-9) = (1-3)(1-9)$
$= (-2)(-8) = 16$

$\underline{x = 3}$: $(x-3)(x-9) = (3-3)(3-9) = 0(-6) = 0$

Summary/recap:

Given quadratic equation $x^2 - 12x + 27 = 0$

(1) Factor LHS: $(x-3)(x-9) = 0$

(2) Solve for when each of the factors equals 0:

$x - 3 = 0$	$x - 9 = 0$
$x = 3$	$x = 9$

two solutions to the orig. eqn

(ie, these are the 2 x-values for which $x^2 - 12x + 27 = 0$)

Check:

$x = 3$: $\quad 3^2 - 12(3) + 27 \overset{?}{=} 0$

$\quad\quad 9 - 36 + 27 \overset{?}{=} 0$

$\quad\quad 36 - 36 = 0$ ✓

$x = 9$:

$9^2 - 12(9) + 27 \overset{?}{=} 0$

$81 - 108 + 27 \overset{?}{=} 0$

$108 - 108 = 0$ ✓

Solve: $(2x + 3) \cdot (3x + 8) = 0$ $\}$ this is actually a quadratic eqn!

By ZPP:

$2x + 3 = 0$ $\sim$ $3x + 8 = 0$

Solve each of these (linear equations) for x:

$2x = -3$

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

$3x = -8$

$$x = -\frac{8}{3}$$

FOIL LHS
_____

$6x^2 + 16x + 9x + 24 = 0$

$6x^2 + 25x + 24 = 0$