Class #14 - Fri., Oct 1

- "std form": $ax^2+bx+c=0$

Last time: Solving quadratic equations

- example using factoring / "zero product property" (ZPP)
- introduced the "square root property" (SRP)

$x^2-k=0 \rightarrow x^2=k$ has 2 solutions:

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

(i.e. $x=\pm\sqrt{k}$).

Ex 9.1 (Textbook)

Solve $x^2-50=0$:

$x^2=50$

$\Rightarrow x=\pm\sqrt{50} = \pm\sqrt{25(2)} = \pm\sqrt{25}\cdot\sqrt{2} = \pm 5\sqrt{2}$

$\left(\sqrt{a\cdot b}=\sqrt{a}\cdot\sqrt{b}\right)$

$\approx 5(1.414\ldots)$

$= 7.05$

Let's look at "$x^2 - 50 = 0$" graphically:

Two ways:

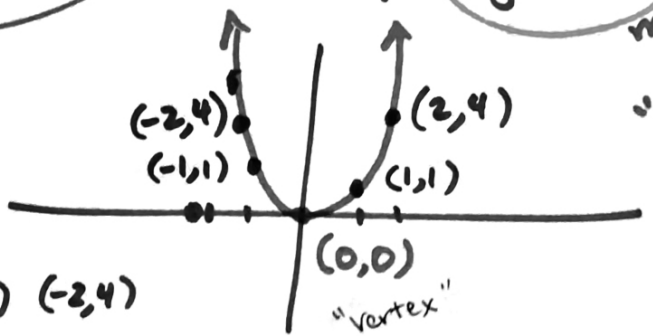
(1) Graph $y = x^2 - 50$

(2) Use "$x^2 = 50$" ~ graph $y = x^2$

equation $x^2 = 50$?

plot in Desmos!

x	$y = x^2$	(x, y)
± 1	$y = (\pm 1)^2 = 1$	$(1,1)$ $(-1,1)$
± 2	$y = (\pm 2)^2 = 4$	$(2,4)$ $(-2,4)$



most basic "parabola"

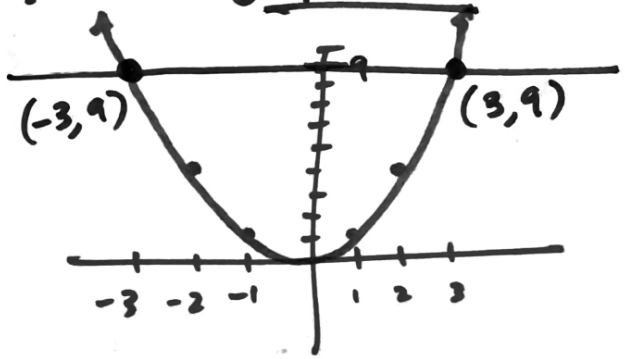
In the textbook, they solved the equation $x^2 = 9$ "algebraically" (using the SRP):

$\rightarrow x = \pm\sqrt{9} = \pm 3.$

We can also analyze this equation graphically

① Plot $y = x^2$

② Plot $y = 9$ (horizontal line!)



Solutions of the equation $x^2 = 9$ are simply the points where the graphs intersect!

Exercise: Plot the graph for the equation $x^2 = 50$.

Square root property – to solve add'l types of quadratic equations:

WW, "SRP", #2

Solve: $(x-6)^2 = 36$

why? { Take square root of both sides:

$$\sqrt{(x-6)^2} = \pm\sqrt{36}$$

$$(x-6) = \pm 6$$

$$x-6 = 6 \quad \text{or} \quad x-6 = -6$$

$$\Rightarrow \boxed{x = 12 \quad \text{or} \quad x = 0}$$

{ How would you transform this to "std form"?

$$(x-6)(x-6) = 36$$
$$x^2 - 12x + 36 = 36$$
$$x^2 - 12x = 0$$
$$\Rightarrow x(x-12) = 0$$

By ZPP:

$x = 0$ or $x - 12 = 0$

$\boxed{x = 0 \text{ or } x = 12}$

Midterm Exam #1 : next week.

- post the Exam Tues.

similar in format to quizzes:
- a few take-home ~~Quiz~~ exercises (written responses)
- a few WebWork exercises.

To prepare for the exam:

(1) Finish the WebWork sets!

(2) Review Quiz #1 (linear equations and graphs of lines!)