a question from 1.1

$3|y+4| - 15 = 0$

$3|y+4| = 15$

$|y+4| = 5$

$y+4 = 5$ OR $y+4 = -5$

$y = 1$ OR $y = -9$

$y \in \{-9, 1\}$

$|A| = B$

$A = B$ OR $A = -B$

The next level

$|A| < B$

$A < B$ AND $A > -B$

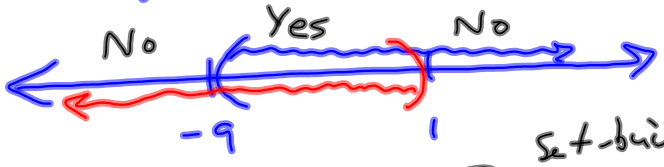
$3|y+4| - 15 < 0$

$3|y+4| < 15$

$|y+4| < 5$

$y+4 < 5$ and $y+4 > -5$

$y < 1$ and $y > -9$




Set-builder

$y \in \{y \mid -9 < y < 1\}$

$= (-9, 1)$ Interval

$=$  Graph

Nate is cool

$|A| > B$

$A > B$ OR $A < -B$

$-B > A > B$ No!

$3|y+4| - 15 > 0$

$3|y+4| > 15$

$|y+4| > 5$ Flip it change sign

$y+4 > 5$ OR $y+4 < -5$

$y > 1$ OR $y < -9$


Just need ONE happy for the "OR".

$-5 > y+4 > 5$

$-5 > 5$ !?

$y \in \{y \mid y > 1 \text{ OR } y < -9\}$

$= (1, \infty) \cup (-\infty, -9)$

Poor Style. Left-to-right is cooler.

Better style.

$\{y \mid y < -9 \text{ OR } y > 1\}$

$= (-\infty, -9) \cup (1, \infty)$

is more like the number line layout.

Pathological Cases.

$|x-7| > -5$

Always

$\mathbb{R}$

$(-\infty, \infty)$

$\{x \mid x \text{ is real}\}$

$|x-7| < -5$

Never!

Nevah!

$\varnothing$

Aug 29-8:07 AM

Solve $x^2 - 10x + 5 = 0$ by

(i) Quadratic Formula

(ii) Completing the Square.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$b^2 - 4ac$ is the Discriminant

Always calculate it first.

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 47

(i) $a = 1, b = -10, c = 5$

$b^2 - 4ac = (-10)^2 - 4(1)5$

$= 100 - 20$

$= 80$

$$x = \frac{10 \pm 4\sqrt{5}}{2}$$

$$= \frac{2(5 \pm 2\sqrt{5})}{2} = 5 \pm 2\sqrt{5}$$

$x \in \{5 \pm 2\sqrt{5}\}$

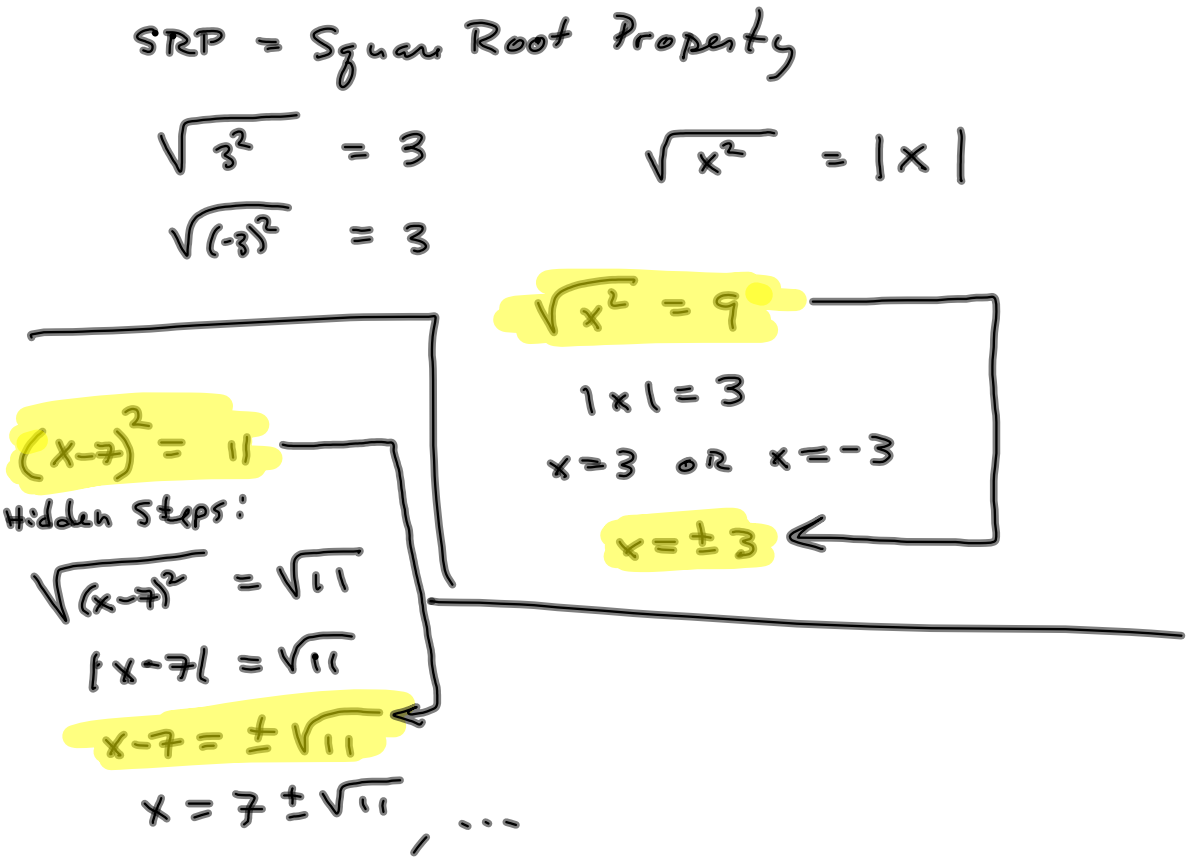
$= \{5 - 2\sqrt{5}, 5 + 2\sqrt{5}\}$

$2 \mid 80$
$2 \mid 40$
$2 \mid 20$
$2 \mid 10$
$5$

$\sqrt{80} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 5}$

$2 \cdot 2\sqrt{5}$

$= 4\sqrt{5}$


SRP = Square Root Property
$\sqrt{3^2} = 3$
$\sqrt{(-3)^2} = 3$
$\sqrt{x^2} = |x|$
$\sqrt{x^2} = 9$
$|x| = 3$
$x = 3$ or $x = -3$
$x = \pm 3$
$(x-7)^2 = 11$
Hidden steps:
$\sqrt{(x-7)^2} = \sqrt{11}$
$|x-7| = \sqrt{11}$
$x-7 = \pm\sqrt{11}$
$x = 7 \pm \sqrt{11}$, ...

(ii) Completing the Square.

$x^2 - 10x + 5 = 0$

$x^2 - 10x = -5$

$\frac{10}{2} = 5 \rightsquigarrow 5^2$ Keith

$x^2 - 10x + 5^2 = -5 + 25$

$(x-5)^2 = 20$

$x - 5 = \pm\sqrt{20} = \pm 2\sqrt{5}$

$x = 5 \pm 2\sqrt{5}$

$(x-3)^2 = x^2 - 6x + 9$

$\frac{6}{2} = 3 \rightsquigarrow 3^2$

$(x+6)^2 = x^2 + 12x + 36$

$\frac{12}{2} = 6 \rightsquigarrow 6^2$

$2 \mid 20$

$2 \mid 10$

$5$

$\sqrt{2 \cdot 2 \cdot 5} =$

$2\sqrt{5}$

Recall. A circle of radius r centered at $(h,k)$ has equation

$$(x-h)^2 + (y-k)^2 = r^2$$

Graph the circle

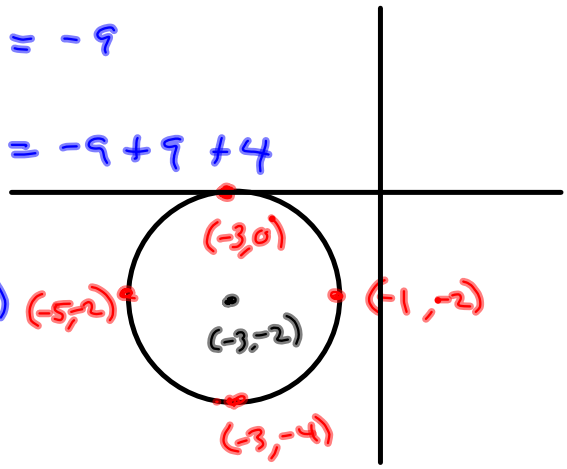
$$x^2+y^2+6x+4y+9 = 0$$

$$x^2+6x \quad y^2+4y = -9$$

$$x^2+6x+3^2+y^2+4y+2^2 = -9+9+4$$

$$(x+3)^2 + (y+2)^2 = 4$$

$r=2$, $(h,k) = (-3,-2)$



# Lines – All review

Let $(x_1, y_1)$ & $(x_2, y_2)$ be points on a line

Then the slope of the line is $m = \frac{y_2 - y_1}{x_2 - x_1}$

An equation of the line, given $(x, y)$ is on it:

**Point-Slope:** Book

$$y - y_1 = m(x - x_1)$$

Me Quickest.

$$y = m(x - x_1) + y_1$$

$$m = \frac{y - y_1}{x - x_1} = m$$

$$y - y_1 = m(x - x_1)$$

→ you can always derive this just by knowing slope.

Build an equation of the line thru $(2, 7)$, with slope 5.

Book

$$y - 7 = 5(x - 2)$$

Me

$$y = 5(x - 2) + 7$$

## Slope-Intercept $y = mx + b$

$(0, b)$ is the y-intercept on the graph.

Build an equation of the line thru $(2,7)$ with slope $m$ in slope-intercept form.

$y = mx + b$

$7 = 5 \cdot 2 + b$

$7 = 10 + b$

$-3 = b$

$y = 5x - 3$

my way

$y = m(x - x_1) + y_1$

$y = 5(x-2) + 7$

$= 5x - 10 + 7$

$y = 5x - 3$

Find an equation of the line perpendicular to $y = 5x - 3$, that passes thru $(7, 11) = (x_1, y_1)$

$m = 5 \Longrightarrow m_{\perp} = -\frac{1}{5}$

$y = -\frac{1}{5}(x - 7) + 11$

$y = m(x - x_1) + y_1$

Graphs & Questions, next time.

§1.6 & 1.7 will be on-line this afternoon.

Test: Week from Wednesday.

Aug 29-8:52 AM