MTH-PC College Algebra 9/25 Sessim 5

$2x^2 + 12x + 22 = 0$

- vertex
- x-int
- graph

Complete the Square

1.) 2020 it!

$(2x^2 + 12x) + 22 = 0$

$\frac{2x}{2}$ $\frac{12x}{2}$

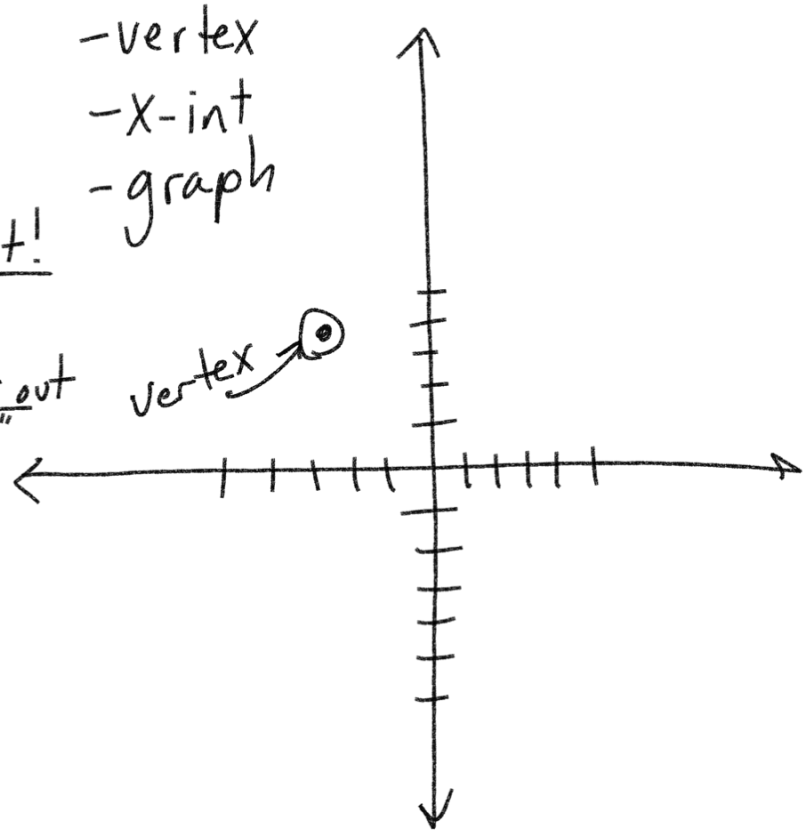
2.) factor out the "a"

$2(x^2 + 6x) + 22 = 0$

3.) $\left(\frac{b}{2}\right)^2$

$b = 6$

$\left(\frac{6}{2}\right)^2 = (3)^2 = 9$



$\boxed{2}(x^2 + 6x) + 22 = 0$

$+9$ $2(-9) = -18$

$2(x^2 + 6x + 9) + 22 - 18 = 0$

$2(x^2 + 6x + 9) + 4 = 0$

4.) Square root first and last

$\sqrt{x^2}$ $\sqrt{9}$

$2(x + 3)^2 + 4 = 0$

slope

$a(x - h)^2 + k$

Vertex: (h, k)

$h = -3$ $k = 4$

$(-3, 4)$

$2(x+3)^2 + 4 = 0$

$-4 \quad -4$

$\frac{2(x+3)^2}{2} = \frac{-4}{2}$

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

$\pm\sqrt{-2} = \pm i\sqrt{2}$

$x + 3 = \pm\sqrt{-2}$

$x + 3 = \pm i\sqrt{2}$

$-3 \quad -3$

$x = \pm i\sqrt{2} - 3$

or

$-3 \pm i\sqrt{2}$

$x^2 - 2x - 8 = 0$ ← y-int

- vertex
- x-int
- graph

1.) Find the vertex by Completing the square

1.) Zero it

$(x^2 - 2x) - 8 = 0$ 2.) factor out a

$\left(\frac{-2}{2}\right)^2 = (-1)^2 = 1$ 3.) $\left(\frac{b}{2}\right)^2$

$(x^2 - 2x) - 8 = 0$

$+1 \quad -1$

$(x^2 - 2x + 1) - 9 = 0$

$\sqrt{x^2} \quad \sqrt{1}$

$(x-1)^2 - 9 = 0$

4.) Square root first and last

$(x-1)^2 - 9 = 0$

$+9 \quad +9$

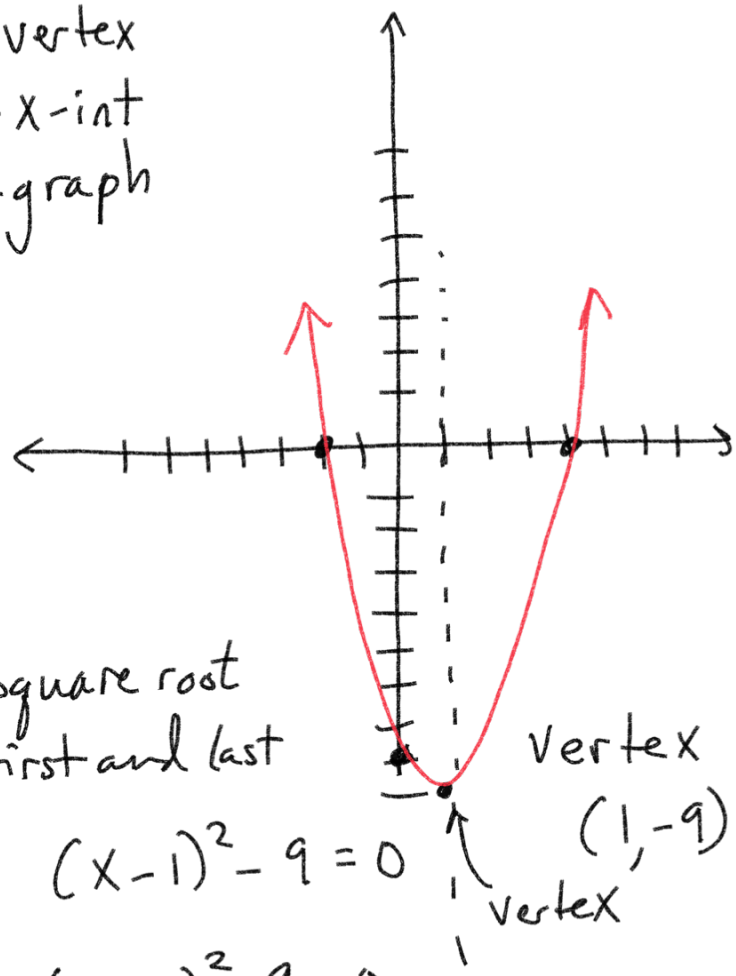
$\sqrt{(x-1)^2} = \sqrt{9}$

$x - 1 = \pm 3$

$+1 \quad +1$

$x = 3+1$ or $-3+1$

4 or -2



Rational Equations (Fraction)

$$\frac{6}{n^2-6n} = \frac{3}{n-6} + \frac{4}{n}$$

$$\frac{6}{12} = \frac{3}{4} + \frac{x}{3}$$

$n-6 \longrightarrow n^2-6n$

$$\frac{6}{n^2-6n} = \frac{n \cdot 3}{n(n-6)} + \frac{4(n-6)}{n(n-6)}$$

$$\left(\frac{6}{n(n-6)} = \frac{3n}{n(n-6)} + \frac{4(n-6)}{n(n-6)}\right) n(n-6)$$

$$6 = 3n + 4(n-6)$$

$$6 = 3n + 4n - 24$$

$$6 = 7n - 24$$

$+24 \quad +24$

$$\frac{30}{7} = \frac{7n}{7}$$

$$\boxed{n = \frac{30}{7}}$$

$$\frac{1}{x-4} + \frac{3}{x+3} = \frac{10}{x^2-x-12} = (\quad)(\quad)$$

$-4 * +3 = -12$

$-4 + 3 = -1$

$$\frac{(x+3)1}{(x+3)x-4} + \frac{3(x-4)}{x+3(x-4)} \quad \frac{10}{(x-4)(x+3)}$$

$$x+3+3(x-4)=10$$

$$x+3+3x-12=10$$

$$4x-9=10$$

$$+9 \quad +9$$

$$\frac{4x}{4} = \frac{19}{4}$$

$$\boxed{x = \frac{19}{4}}$$

$$2 = \sqrt{x+10} - 5$$

$$+5 \qquad +5$$

$$(7)^2 = \left(\sqrt{x+10}\right)^2$$

$$49 = x+10$$

$$-10 \quad -10$$

$$\boxed{39 = x}$$

First isolate the radical

$\sqrt{\quad}$ → possible restrictions

↑ must be ≥ 0

$$x+10 \geq 0$$

$$-10 \quad -10$$

$$x \geq -10$$

$$\left((5x-1)^{\frac{1}{3}}\right)^3 = (4)^3$$

$$(5x-1)^{1/3} = \sqrt[3]{5x-1}$$

$$5x-1 = 64$$
$$+1 \quad +1$$

$$\frac{5x}{5} = \frac{65}{5}$$

$$\boxed{x = 13}$$

Restrictions only for even roots

$$4^{-2} = \frac{1}{4^2} = \frac{1}{16}$$

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

What if?

$$\sqrt{5x-1} = -2$$

no solution

$$3^2 = 3 \cdot 3$$

$$\left(\sqrt{x^2-2x-5}\right)^2 = (x+1)^2$$

$$(x+1)^2 = (x+1)(x+1)$$

$$x^2-2x-5 = (x+1)^2$$

FOIL

$$x^2-2x-5 = (x+1)(x+1)$$

$$\sqrt{x^2-2x-5}$$

$$x^2-2x-5 \geq 0$$

$$x^2-2x-5 = x^2+x+x+1$$

$$x^2-2x-5 = x^2+2x+1$$
$$-x^2 \quad -x^2$$

$$-2x-5 = 2x+1$$
$$+5 \quad +5$$

$$-2x = 2x+6$$
$$-2x \quad -2x$$

$$-4x = 6$$
$$\frac{-4}{-4} \quad \frac{6}{-4}$$

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

$x^2 - 2x - 5 \geq 0$ Restrictions

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-5)}}{2(1)}$

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

$x^2 - 2x - 5 \geq 0$ $\frac{2 \pm \sqrt{4 + 20}}{2}$

$\frac{2 \pm \sqrt{24}}{2} = \frac{2 \pm 2\sqrt{6}}{2}$

$1 \pm \sqrt{6}$