MTH-PC College Algebra Session 26 12/15

1.) Graph and find the vertex

a) $f(x) = -(x+2)^2 - 3$

vertex form

$(-2, -3)$

vertex

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

line of symmetry

$x = -2$

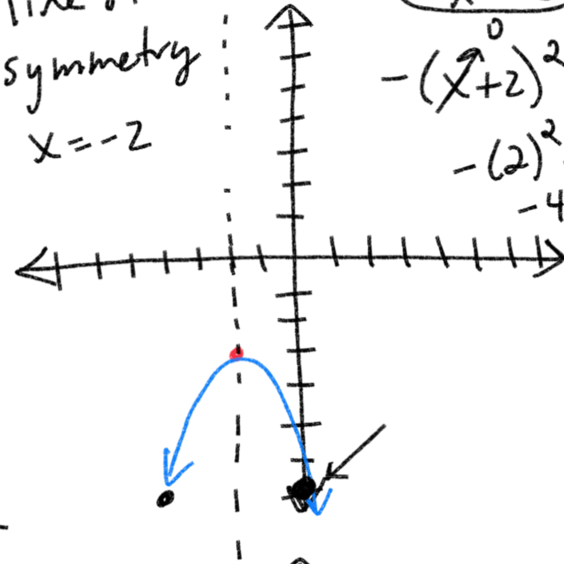
y-int

$x = 0$

$-(0+2)^2 - 3$

$-(2)^2 - 3$

$-4 - 3 = -7$



b) $x^2 + 12x - 6$ ← y-int

complete square

vertex

$(-6, -42)$

$(x^2 + 12x) - 6$

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

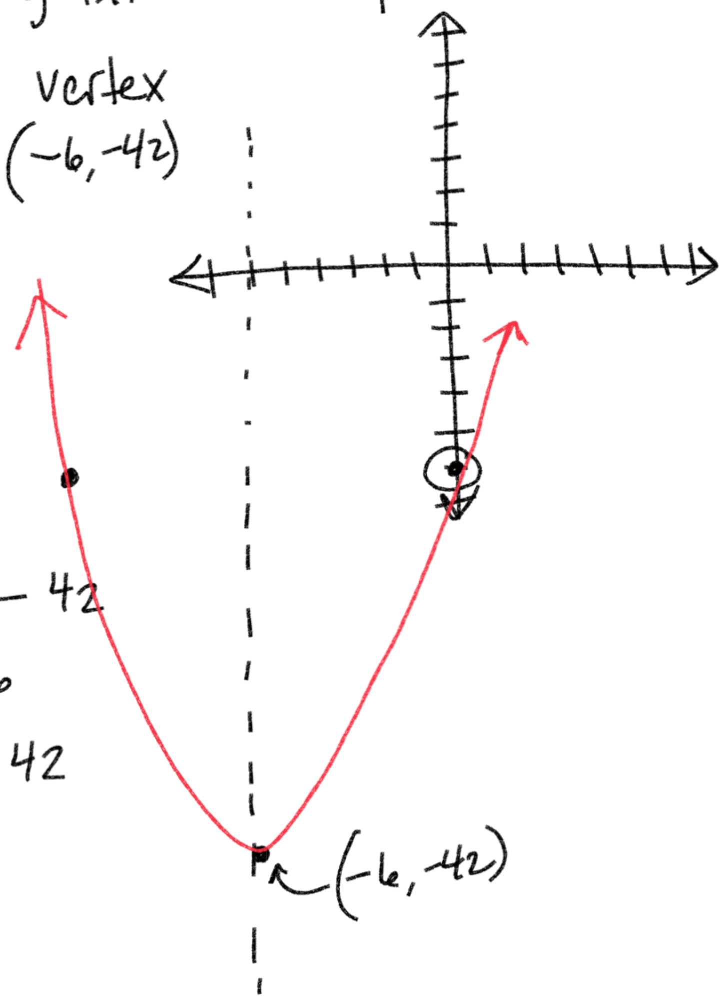
$\left(\frac{12}{2}\right)^2 = 36$

$+36$ $\quad -36$

$(x^2 + 12x + 36) - 42$

$\sqrt{x^2}$ $\quad \sqrt{36}$

$(x+6)^2 - 42$



$(-6, -42)$

$(x+6)^2 - 42 = 0$

$\quad +42 \quad +42$

$\sqrt{(x+6)^2} = \sqrt{42}$

$x + 6 = \pm\sqrt{42}$

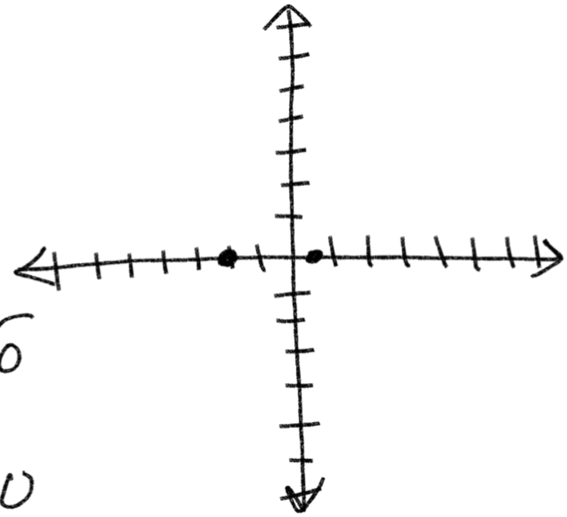
$\quad -6 \quad\quad -6$

$x = -6 \pm \sqrt{42}$

$f(x) = (x+2)^2 (x - \frac{3}{5})^3$

$0 = (x+2)^2 (x - \frac{3}{5})^3$

$\sqrt{(x+2)^2} = \sqrt{0} \qquad \sqrt[3]{(x - \frac{3}{5})^3} = \sqrt[3]{0}$



$x + 2 = 0 \qquad x - \frac{3}{5} = 0$

$-2 \quad -2 \qquad +\frac{3}{5} \quad +\frac{3}{5}$

$\boxed{x = -2} \qquad x = \frac{3}{5}$

multiplicity of 2 $\qquad$ mult of 3

$(x+2)^2 (x - \frac{3}{5})^3 = (x+2)(x+2)(x - \frac{3}{5})(x - \frac{3}{5})(x - \frac{3}{5})$

Polynomials must have:

all variable exponents must be a whole number

$x^3 + x^2 + 3x + 6$ polynomial

$x^2 + 4x^{2/3}$ not polynomial

$x^3 + x^{-4}$ not polynomial

$f(x) = x^{4}(x-1)^{2}(x+2.5)^{3}$ zeros and multiplicity

$\sqrt[4]{x^4} = \sqrt[4]{0}$ $x = 0$ mult of 4 | $x = 1$ mult of 2 | $x = -2.5$ mult of 3

$x = 0$

$-2x^{3} + 4x^2 + 6x = 0$

How many total zeros? 3
what are the zeros?

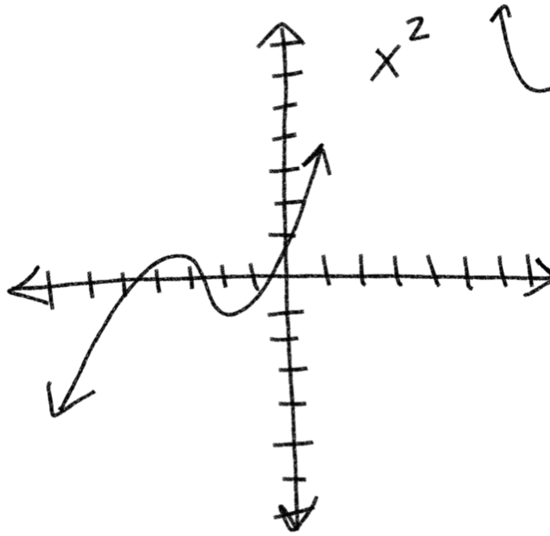
$-2x(x^2 - 2x - 3) = 0$

$-2x(x-3)(x+1) = 0$

$x = 0$ mult of 1 | $x = 3$ mult of 1 | $x = -1$ mult of 1

$x - 3 = 0$
$+3 \quad +3$
$x = 3$

x^2



$f(x) = 4x^{2}(x^{2}-1)(x^2+9)$

$4x^2 = 0$
$\frac{4x^2}{4} = \frac{0}{4}$
$\sqrt{x^2} = \sqrt{0}$
$\boxed{x = 0}$ mult of 2

$x = 1$ mult of 2

$x^2 + 9 = 0$
$-9 \quad -9$
$\sqrt{x^2} = \sqrt{-9}$
$x = \pm 3i$

Zeros & mult.

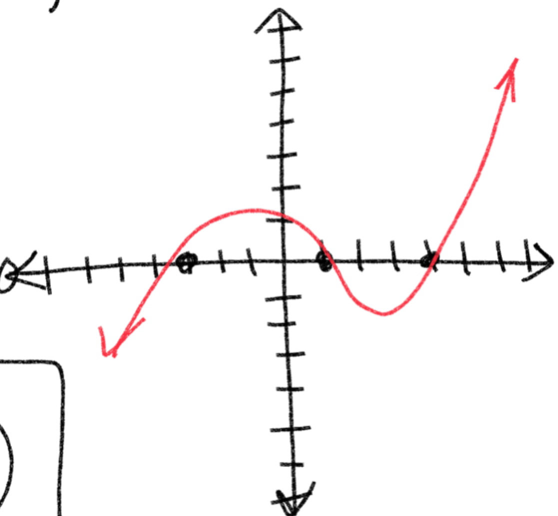
Zeros:	0	1	$3i$	$-3i$
mult:	2	2	1	1

How many possible zeros: 6

Real zeros: 4

Find the equation for the line with the zeros: $-3, 1, 4$

$$x = -3 \qquad x = 1 \qquad x = 4$$
$$+3 \quad +3 \qquad -1 \quad -1 \qquad -4 \quad -4$$
$$x+3=0 \qquad x-1=0 \qquad x-4=0$$



$$\boxed{(x+3)(x-1)(x-4)}$$

Find the equation for the line with:

zeros $\boxed{\begin{matrix}-5 \\ \text{mult of } 3\end{matrix}}$ $\quad \begin{matrix}-1 \\ \text{mult of } 2\end{matrix} \quad 3 \quad \begin{matrix}7 \\ \text{mult of} \\ 4\end{matrix}$

$$(x+5)^3(x+1)^2(x-3)(x-7)^4$$

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

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

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

zeros: 0, −2, 1

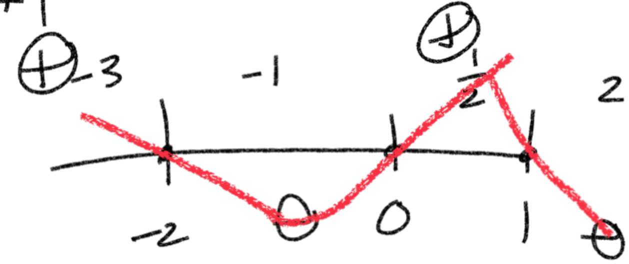
$2 * -1 = -2$

$2 + -1 = +1$

# of possible solutions 3

# of real solutions 3

at zeros crosses or bounces



$f(x) = -x(x+2)(x-1) = 0$

$f(-3) \quad -(-3)(-3+2)(-3-1)$

$(+) * (-) * (-) = (+)$

$f(-1) = -(-1)(-1+2)(-1-1)$

$(+) * (+) * (-) = (-)$

$f(\tfrac{1}{2}) \quad -(\tfrac{1}{2})(\tfrac{1}{2}+2)(\tfrac{1}{2}-1)$

$(-) * (+) * (-) = (+)$

$f(2) \quad -(2)(2+2)(2-1)$

$(-) * (+) * (+) = (-)$