Finding zeros of a function:

Zeros of a function are x-intecepts of the graph.

One way to find zeros of a function is to
FACTOR the function and find the zeros of each factor.

How do you find the zeros of a function if you
can't factor it?

Use technology

Finding zeros of a function with the graphing calculator:

Method 1: Finding ZEROS

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

Use the option on the graphing calculator to find zeros:
2ND TRACE
2: ZEROS

zeros are: -2.81 , -1

Zeros of a function are the values of x when y = 0.

Method 2: Finding Intersections

$$0 = x^4 + 2x^3 - 3x^2 - x + 3$$

Graph $Y_1 = x^4 + 2x^3 - 3x^2 - x + 3$
and $Y_2 = 0$

use the option on the graphing calculator
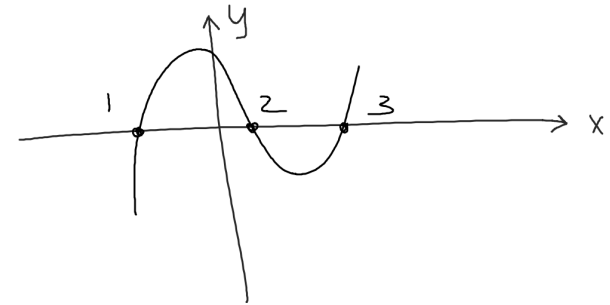to find points of intersection.
2ND TRACE
5: intersect

zeros are: -2.81 , -1

When finding zeros by graphing you are only able to find the REAL zeros!

Find the real zeros of this function: $y = x^3 - x^2 - 5x + 3$
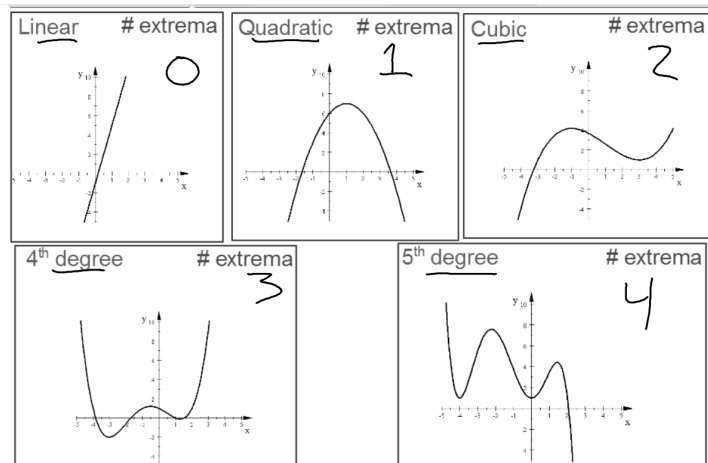
1. -2.09
2. 0.57
3. 2.51

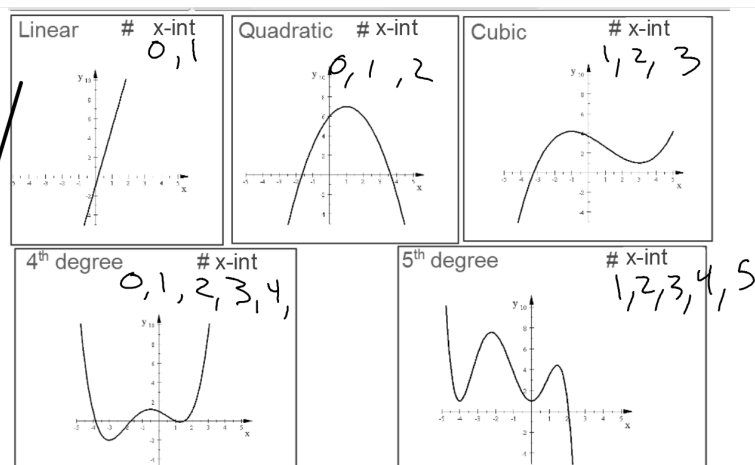What if you don't have a graphing calculator to find zeros?

Check out my blog!

You can now finish Hwk #26

Practice Sheet

Linear # extrema	Quadratic # extrema	Cubic # extrema
O	1	2

4th degree # extrema	5th degree # extrema
3	4

Number of extrema of a polynomial:

If the degree of the polynomial is n
then there can be up to n-1 extrema.

Linear # x-int	Quadratic # x-int	Cubic # x-int
0,1	0, 1 ,2	1, 2, 3

| 4th degree # x-int	5th degree # x-int
0,1,2,3,4,	1,2,3,4,5

X - Intercepts -- Can have up to n x-intercepts.
n = degree of polynomial

EVEN Functions may have no x-intecept or multiple x-intercepts.
ODD Functions must have at least 1 x-intercept

Panel 1 (top-left):

Y - intercepts -- All polynomials have exactly ONE y-intercept.

Panel 2 (top-right):

find all max, min, and zeros of this function.

$$y = -0.1x^4 + 1.4x^3 - 5.1x^2 + 1.4x + 8$$

ABS max
$(.15, 8.1)$ & $(6.85, 8.1)$

ABS min
NONE

Rel max
NONE

Rel min
$(3.5, -4.56)$

zeros:
$-1, 2, 5, 8$

$(.15, 8.1)$ $(6.85, 8.1)$

Panel 3 (bottom-left):
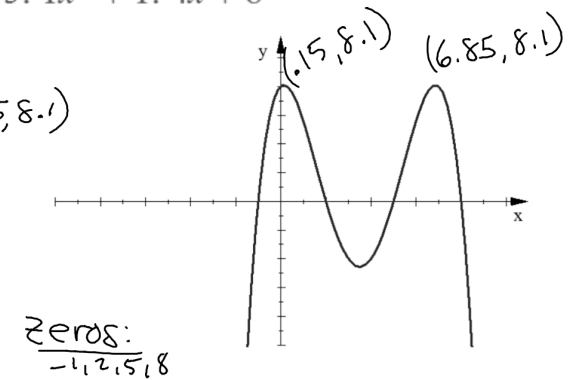
X-intercepts of a graph are also.....

......Solutions to the equation when y=0

Panel 4 (bottom-right):

Every polynomial has exactly n solutions, where n is the degree of the polynomial.

Some of these solutions may be imaginary so not all solutions can be found by graphing.

Sec 6-4:   Solving Polynomial Equations

- Solve by factoring

- Solve by graphing

Solve by factoring (same question as if I asked you to find the zeros of the function!)

Find ALL Complex solutions.

$$3x^7 + 6x^5 - 9x^3 = 0$$

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

$$+3 \overset{-3}{\underset{+2}{\diagdown}} {-1} \implies 3x^3(x^2-1)(x^2+3) = 0$$

$$3x^3(x\pm1)(x^2+3) = 0$$

$$X=0,0,0 \quad X=\pm1 \qquad x^2+3=0$$
$$\sqrt{x^2}=\sqrt{-3}$$
$$X=\pm i\sqrt{3}$$

$$X = 0, \pm1, \pm i\sqrt{3}$$