3-3 Graphing Polynomial Functions from Standard Form

Objectives:

3.1

- I can find the zeroes of a polynomial by using the factor theorem, remainder theorem, and rational roots theorem

-I can then graph the polynomial by hand once I have found the zeros

3.2

Discussion:

In order to GRAPH $x^3 - 8x^2 + 19x - 12$ by hand, what information do we need?

multiplicity, end behavior, zeros

What form do we need the polynomial to be in?

( )( )( ) factor form

How can we get it to that form?

Factor!

Recall: Finding the Zeros of a Polynomial

-Factoring: Find GCF first, then may use special factoring, factoring by grouping, or quadratic factoring

-Factor Theorem

-Remainder Theorem

Use to test a factor from rational roots theorem

-Rational Roots Theorem: Helps determine possible rational roots using $x = \pm \frac{\text{factors of constant}}{\text{factors of leading coefficient}}$

Recall: Graphing a polynomial from factored form

-Find zeros by setting factors equal to zero and solving

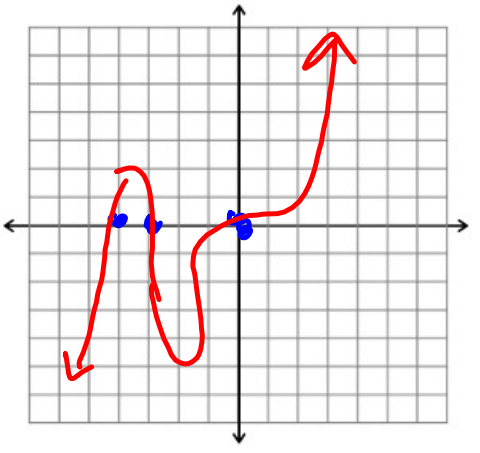
-Use degree to determine end behavior

-Sign Charts

-Multiplicity

Ex. Find the zeros of the polynomial, then graph by hand

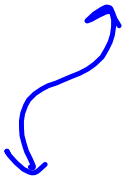
$$f(x) = x^5 + 7x^4 + 12x^3$$



$x^3(x^2+7x+12)$

$x^3(x+3)(x+4)$

ZEROS	MULT
0	3 I Slide
-3	1 STR
-4	1 STR

EB: x^5 

Ex. Find the zeros of the polynomial, then graph by hand

$$f(x) = x^3 + 3x^2 - 4x - 12$$

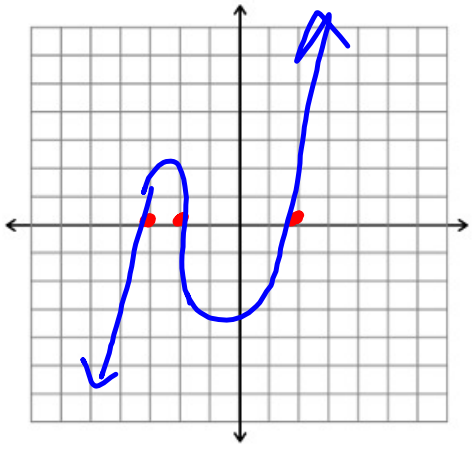
POSSIBLE: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

-2 | 1 3 −4 −12
| −2 −2 12
| 1 1 −6 0

2 | 1 3 −4 −12
| 2 10 12
| $1x^2 + 5x + 6$ 0

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

ZERO	MULT
−3	1 STR
−2	1 STR
2	1 STR



EB: x^3

Ex. Find the zeros of the polynomial, then graph by hand

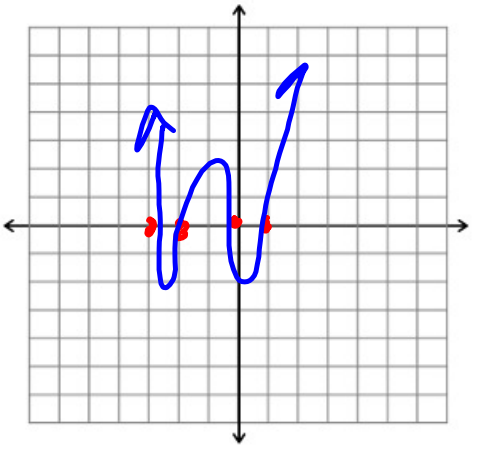
$$f(x) = x^4 + 4x^3 + x^2 - 6x$$

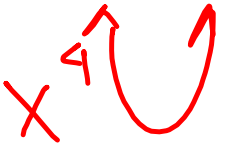
$x(x^3 + 4x^2 + x - 6)$

	1	4	1	−6
1	↓	1	5	6
	$1x^2+5x+6$			0

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

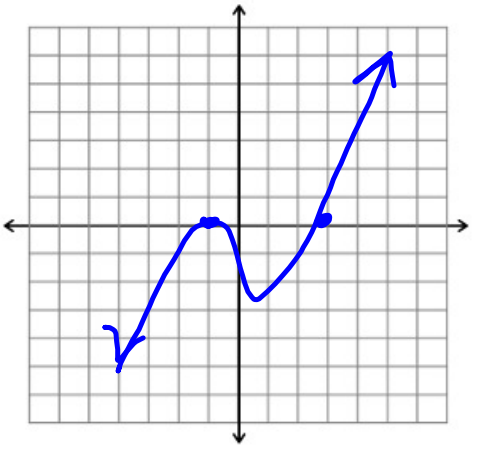
ZERO	MULT
0	1 STR
1	1 STR
−2	1 STR
−3	1 STR





You Try! Find the zeros of the polynomial, then graph by hand

$$f(x) = x^3 - x^2 - 5x - 3$$



$-1 \mid 1 \quad -1 \quad -5 \quad -3$

$\quad\quad\downarrow \quad -1 \quad 2 \quad 3$

$1x^2 - 2x - 3 \mid 0$

$(x+1)(x-3)(x+1)$

$(x+1)^2(x-3)$

zeros	mult
-1	2 Tan B
3	1 STR

EB: x^3