3-3 Graphing Polynomial Functions from Standard Form

Objectives: $5x^3+2x^2-5x+1$

- 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

Discussion:

$(x+\#)(x-\#)^2$

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

What form do we need the polynomial to be in?

How can we get it to that form?

- Factor
- synthetic

① GCF

② Synthetic division
remainder ☺

③* Quadratic → 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

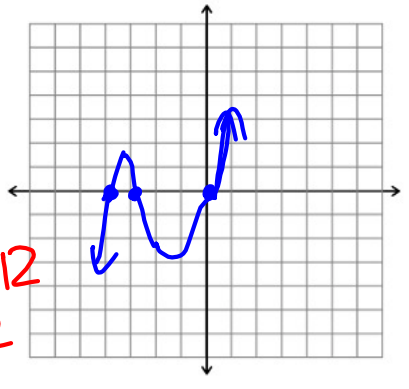
Ex. Find the zeros of the polynomial, then graph by hand

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

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

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

1 · 12 · 12
1 12
2 6
3 4



$x = 0$ m: 3
$x = -3$ m: 1
$x = -4$ m: 1

x^5 +

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

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

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

1

3 | 1 3 -4 -12

↓ 3 18 42

1 6 14 X

2 | 1 3 -4 -12

↓ 2 10 12

1 5 6 ☺

x^2 x #

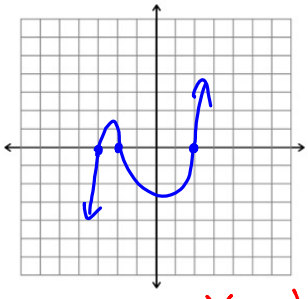
$(x-2)(x^2+5x+6)$

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

$1 \cdot 6 = 6$

$-1+6$

2 3

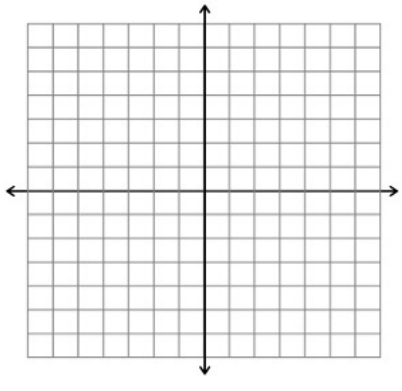


$(x-2)(x+3)(x+2)$

$x^3 +$

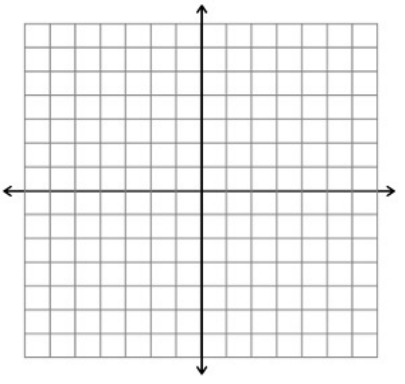
Ex. Find the zeros of the polynomial, then graph by hand

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



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

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



1. $x^3 - 8x^2 + 19x - 12$

1 | 1 -8 19 -12

↓

1. 1

2. gcf -4

3. gcf $\rightarrow x^2$

4. -2