

## IM3 Lesson 4.6 Day 2

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> <li>• What is a Polynomial and how do they look?</li> <li>• What are the attributes of a Polynomial?</li> <li>• How do I work with Polynomials?</li> <li>• Beginning to work with Synthetic Division</li> </ul>		
CONTEXT of this LESSON:	Where we've been  We have been working with the graphs of polynomials	Where we are  Continuing with working with graphs and equations of polynomials. As well, synthetic division... today focusing on the stretch factor.	Where we are heading  Being able to take a function from standard form into factored for using synthetic division.

### Lesson Objectives:

- Warm up with some closing concepts from our graphical investigations.
- Connect the multiplicities of zeros to the behavior near the x axis.
- Connect the leading coefficient with end behavior
- Identify all extreme: Local and Absolute minimums and maximums.
- Finding the y-intercepts
- Finding the "a" value.
- Work with synthetic division to help us put polynomials into factored form.
- Observe what happens to polynomials that are divided by a linear term.

### Part 1.1: Graphical Closure part 3

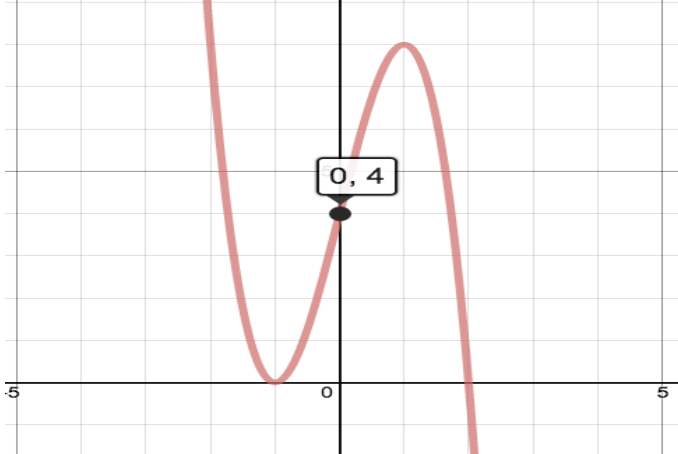
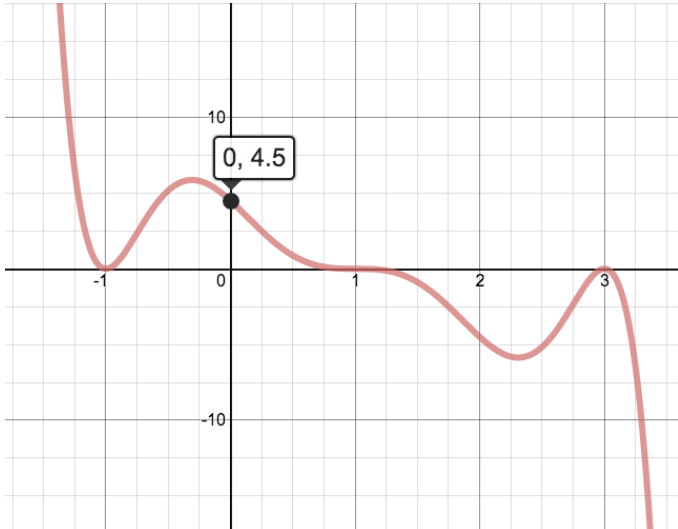
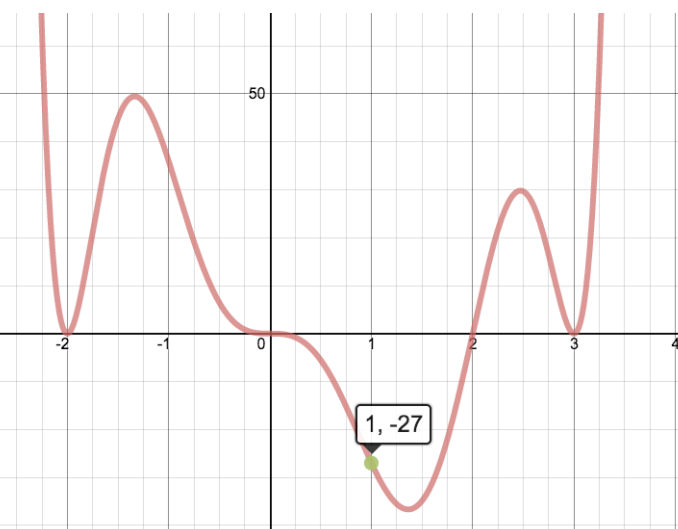
Given the following equations in factored form, "sketch" the graphs

Equation	+ or -	Degree	Y - Int	f(-2) =	f(x) = -7
$f(x) = -2(x - 1)^2(x + 3)(2x + 4)$					
$f(x) = -3x(x - 4)^3$					
$f(x) = 0.5(x - 2)^3(x + 1)^4$					
$f(x) = 1.5(2 - x)^5x^2(x + 5)$					
$f(x) = -2x^3(x - 1)^4(x + 3)^2(x - 4)(x + 6)^2$					

**Part 1.2: Graphical Closure part 4**

Given the following graphs...

- Write a possible factored form equation.
- Find the "a" Value given the information on the graph
- Identify Local/Absolute Minimums and Maximums

	<p><b>Factored Form Equation:</b></p>
	<p><b>Finding the "a" value</b></p>
	<p><b>Find the Values of the Extrema</b></p>
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	<p><b>Finding the "a" value</b></p>
	<p><b>Find the Value of the Extrema</b></p>

## Part 2: Fully Factor and graph two of the following three polynomials

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

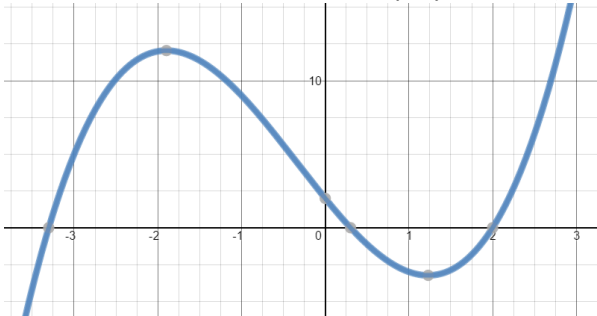
$$f(x) = 2x^3 - 10x^2 - 34x + 42$$

$$f(x) = 2x^4 - 8x^3 - 20x^2 + 56x - 30$$

## Part 3: Synthetic Division Work

### (A) Examples

- Which binomials are factors of  $P(x) = 2x^3 - x^2 - 7x + 6$ ? (a)  $x + 3$  (b)  $2x - 3$
- Which binomials are factors of  $P(x) = -2x^4 - 7x^3 + 22x^2 + 63x - 36$ ? (a)  $x - 1$  (b)  $x - 3$
- Given the polynomial  $P(x) = x^3 - 2x^2 - 21x - 18$ , is  $x = 6$  a zero of  $P(x)$ ? is  $x = -2$  a zero of  $P(x)$ ?
- Given the polynomial  $P(x) = x^4 - 3x^3 + 3x^2 - 3x + 2$ , is  $x = 2$  a root of  $P(x)$ ? is  $x = 2$  a root of  $P(x)$ ?
- Given the polynomial  $g(x) = 2x^3 + x^2 - 27x - 35$ , one factor of  $x + 3$  is given. Determine the other factors.
- Factor  $P(x) = x^4 - 6x^3 + 22x^2 - 30x + 13$  given that  $x = 1$  is a double root.
- Given the polynomial  $h(x) = x^4 + 3x^3 - x - 3$ , one of the roots is  $x = -3$ . Determine the other roots.
- Determine all roots of the polynomial  $A(x) = x^3 + x^2 - 7x + 2$ , given the following graph of  $A(x)$



- Factor using the Factor Theorem:  $f(x) = x^3 - 3x^2 - 10x + 24$
- Factor using the Factor Theorem:  $f(x) = x^4 + 2x^3 - 23x^2 - 24x + 144$
- Sketch the function  $g(x) = 6 + 5x - 2x^2 - x^3$
- Sketch the function  $f(x) = 3x^3 + x^2 - 22x - 24$  & label all intercepts.
- Sketch the function  $f(x) = x^4 + x^3 - 7x^2 - x + 6$  & label all intercepts.