Advanced Math **Section 3.2 Day 2 Notes** **Name:**

Learning Target: *☺ Finding the zeros of a polynomial and their multiplicities, and using them along with end behavior, to sketch the graph of a polynomial by hand.*

Find the real zeros by factoring.

Example 1: $P(x) = x^3 - 6x^2 + 8x$

Example 2: $P(x) = x^5 - 20x^3 + 64x$

Intermediate Value Theorem:

*Use the **Intermediate Value Theorem** to verify that $P(x)$ has a zero between a and b.*

a. $P(x) = 2x^3 - 21x^2 - 2x + 25; \quad a = 1, \quad b = 2$

b. $P(x) = x^3 - x - 8; \quad a = 2.1, \quad b = 2.2$

- If when you plug in two values for x the signs change for y, what does that mean?

Multiplicity of a Zero:

EVEN and ODD Powers of $(x - c)$ Theorem:

Multiplicity of the Zero is _____ the graph _____

Multiplicity of the Zero is _____ the graph _____

*Determine the x-intercepts of the graph of $P(x)$. For each x-intercept, use the **EVEN and ODD Powers of** $(x - c)$ **Theorem** to determine whether the graph of $P(x)$ crosses the x-axis (**passes through**) or intersects but does not cross (**bounces off**) the x-axis. Also, determine the **multiplicity** of each x-intercept.*

a. $P(x) = -(x+3)^2(x-9)$

_____ multiplicity_____ pass through/bounce

_____ multiplicity_____ pass through/bounce

b. $P(x) = (x+2)(x-6)^2$

_____ multiplicity_____ pass through/bounce

_____ multiplicity_____ pass through/bounce

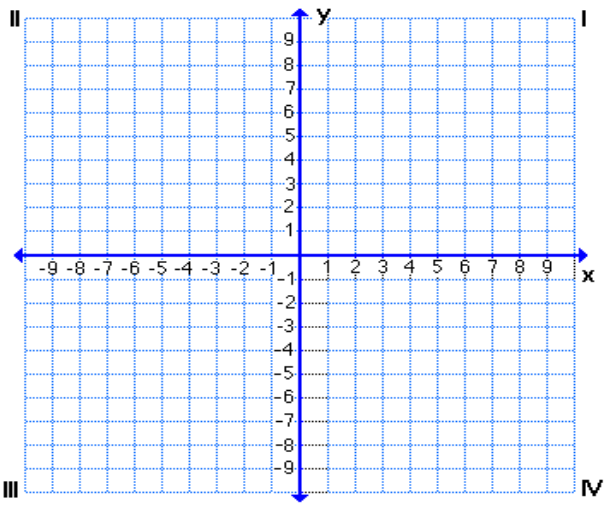
Sketching polynomials WITHOUT TABLES OR GRAPHING CALCULATORS! ☺

Procedure for graphing:

1. Start by graphing the zeros
2. Then determine whether the graph passes through the zero or hits and bounces off the zero
3. Graph (if possible) the y-intercept
4. Determine the end behavior – which way should the arrows go?
5. Create a smooth curve connecting the intercepts

Sketch the graph of the polynomial function using end behavior, leading coefficients, x-intercepts and y-intercepts.

a. $P(x) = x^3 + x^2 - 6x$
[factor first!!]



What is the **degree** of the polynomial?_____

What **kind of number** is the degree?_____

What is the **sign** of the **leading coefficient**?_____

What is the **end behavior**?

As $x \to \infty$, $f(x) \to$

As $x \to -\infty$, $f(x) \to$

What are the x-intercepts (zeros) & their multiplicities?

_____ multiplicity_____ pass through/bounce

_____ multiplicity_____ pass through/bounce

_____ multiplicity_____ pass through/bounce

What is the y-intercept? [plug in $x = 0$] _____

You will only graph this if it fits – if it doesn't, just estimate!

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1. Start by graphing the zeros
2. Then determine whether the graph passes through the zero or hits and bounces off the zero
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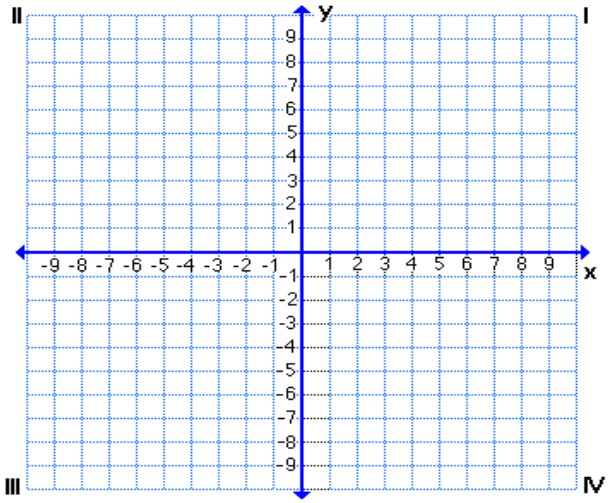
5. Create a smooth curve

Sketch the graph of the polynomial function using end behavior, leading coefficients, x-intercepts and y-intercepts.

b. $P(x) = -(x-3)^2(x+1)$



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What is the y-intercept? [plug in x = 0] _____

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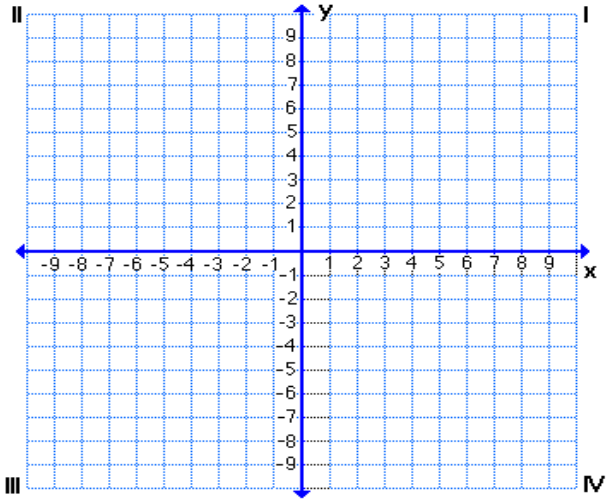
c. $P(x) = -(x-2)^2(x+1)^2$



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What is the y-intercept? [plug in x = 0] _____

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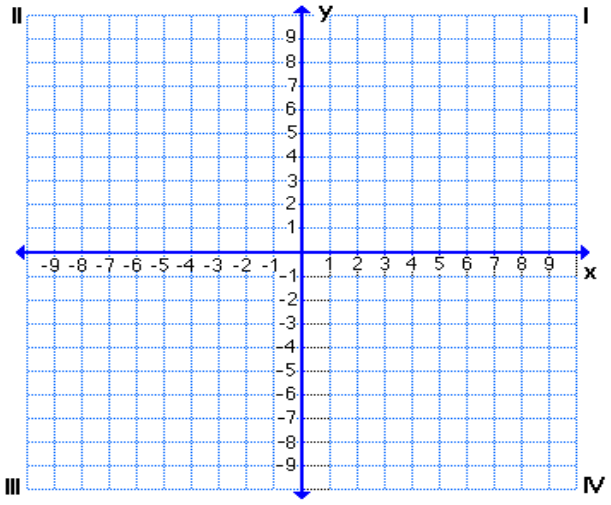
Key Ideas:

HW: Check the calendar for the assignment, but use the graph paper & format on the back of this note packet to do #41, 47, and 51

Do #41, 47 and 51 from page 284 right here!!

41. $P(x) = x^3 - x^2 - 2x$



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_____ multiplicity_____ pass through/bounce

_____ multiplicity_____ pass through/bounce

What is the y-intercept? [plug in x = 0] _____

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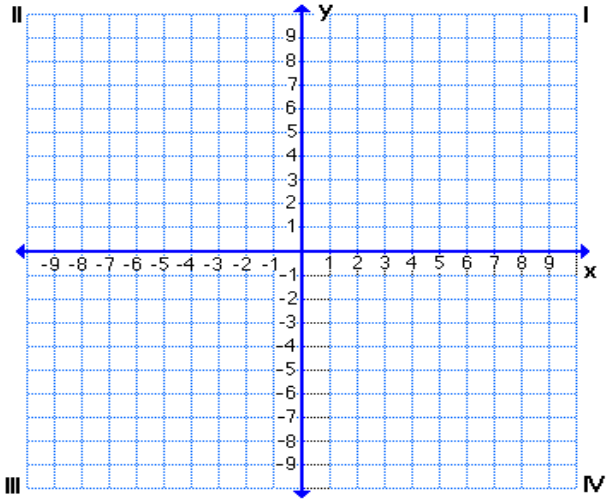
47. $P(x) = (x-1)(x+3)(x+4)$



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What are the x-intercepts (zeros) & their multiplicities?

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_____ multiplicity_____ pass through/bounce

_____ multiplicity_____ pass through/bounce

What is the y-intercept? [plug in x = 0] _____

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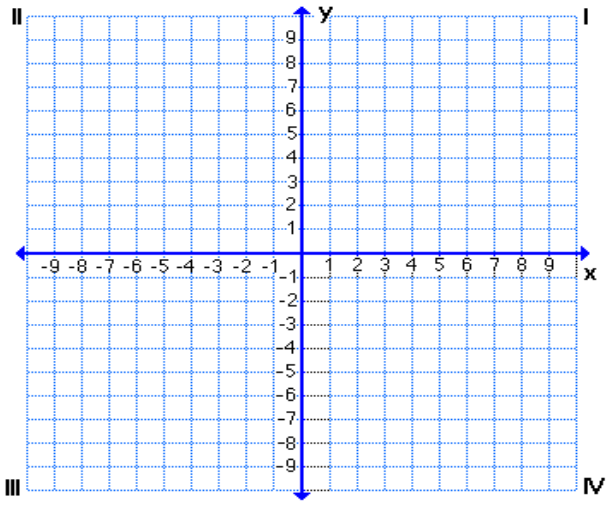
51. $P(x) = -x(x-2)^2$



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What is the y-intercept? [plug in x = 0] _____