Journal Entry:

-Can the graph of a polynomial function be a straight line? If so, give an example of the function and show a graph of it.

Aug 18-2:52 PM

Section 5-2
Polynomials, Linear
Factors and Zeros

Students will be able to:
-analyze the factored form of a polynomial
-write a polynomial function from its zeros

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Zeros of a function:
   If P(x) = 0, all solutions are the zeros of the function.

Finding the zeros of the function will help you factor the polynomial, graph the function and solve the related polynomial equation.

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Solve by finding zeros (Chapter 4)

$0 = x^2 - 6x + 5$

$0 = (x - 5)(x - 1)$

$x = 5, 1$

We used the Zero Product Property to solve. You can use the same method to solve polynomials.

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Factor:
$x^3 - x^2 - 12x$

$x(x^2 - x - 12)$

$$\begin{array}{c|c} 1 & 12 \\ 2 & 6 \\ \boxed{3} & \boxed{4} \end{array}$$
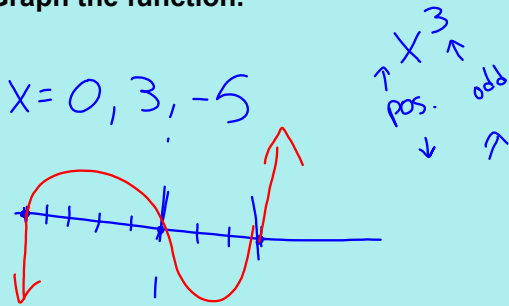
$x(x + 3)(x - 4)$

$x = 0, -3, 4$

Aug 18-2:52 PM

The following are all true for the polynomial function P(x) and a real number b

   x - b is a factor of P(x)
   b is a root (or solution) of P(x) = 0
   b is an x-intercept of the graph of y = P(x)

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What are the zeros of y = x(x - 3)(x + 5)? Graph the function.

$x = 0, 3, -5$

x^3
pos.   odd

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The factor theorem describes the relationship between the linear factors of a polynomial and the zeros of a polynomial.

Factor Theorem- the expression x - a is a factor of a polynomial if and only if the value a is a zero of the related polynomial function.

Aug 18-2:52 PM

What is a cubic polynomial function with zeros 3, 3, and -3?

$y = (x - 3)(x - 3)(x + 3)$

$y = (x^2 - 6x + 9)(x + 3)$

$y = x^3 - 6x^2 + 9x + 3x^2 - 18x + 27$

$y = x^3 - 3x^2 - 9x + 27$
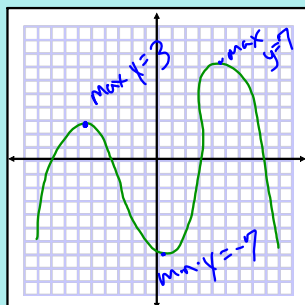
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f(x) = (x - 1)(x - 1)(x + 3)

Since x - 1 appears twice, we can say that 1 (the zero or solution of the factor x - 1) is a zero of multiplicity 2.

Aug 18-2:52 PM

If the graph of a polynomial has several turns, the function has a relative minimum and/or a relative maximum.
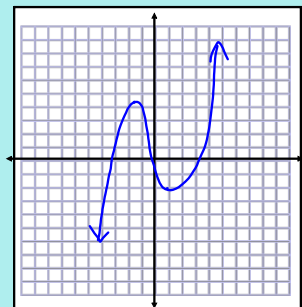
max $x = 3$ max $y = 7$

min $y = -7$

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What are the relative min and/or max of the following?

f(x) = 3x³ + x² - 5x

max : 3.15 = y

min : -2 = y

Aug 18-2:52 PM

2

Hwk: pg. 293 - 294
#8 - 36 (4th), 38, 40, 44,
48, 54, 56

Aug 18-2:52 PM