Monday 12/9/19

1. Grab Notes/Calc.
2. Begin Warm-up
3. Take out HW/Calend.
4. FTA Notes, HW
5. TEST THURSDAY!!!

US History & Biology: Dec 9-10		
Block	**Time**	**Minutes**
1st	8:20-9:55	95
2nd	10:01-11:36	95
3rd	11:42-1:47	125
A lunch- TESTERS GO TO A LUNCH	11:42-12:07	25
Test runs	12:13-1:48	95
B lunch	12:15-12:40	25
C lunch	12:48-1:13	25
D lunch	1:22-1:47	25
4th	1:54-3:30	96

Topic: Fundamental Theorem of Algebra (FTA) **Name**: _____

What am I learning today?

Warm-Up

Solve using the Quadratic Formula:

1) $f(x) = 8x^2 - 4x - 18$

a=8 b=-4 c=-18

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(8)(-18)}}{2(8)}$

$x = \frac{4 \pm \sqrt{592}}{16}$

2) $f(x) = 10x^2 - x + 9$

a=10 b=-1 c=9

$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(10)(9)}}{2(10)}$

$x = \frac{1 \pm \sqrt{-359}}{20}$

$x = \frac{1 \pm i\sqrt{359}}{20}$

How many zeros will the following polynomials have?

3) $f(x) = 4x^3 - 2x^2 + x - 21$ → 3 zeros

4) $f(x) = x^8 - 2x^5 + 6x - 2$ → 8 zeros

Notes
The Fundamental Theorem of Algebra

Number of Zeros: The fundamental theorem of algebra states that a polynomial will have the same number of zeros. as it's degree.

Types of Zeros: A polynomial can have real or imaginary zeros.

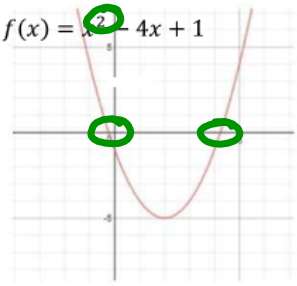
Real zeros can be seen on the graph as the x intercepts.

Imaginary zeros cannot be seen on the graph. They always come in pairs.

Examples

Using the graph provided state the number and type of zeros.

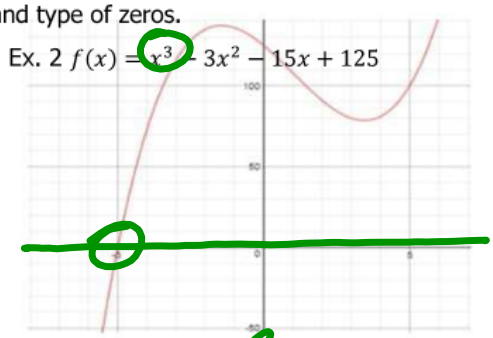
Ex. 1 $f(x) = x^2 - 4x + 1$



Number of Zeros: 2

Type of Zeros: 2 Real

Ex. 2 $f(x) = x^3 - 3x^2 - 15x + 125$



Number of Zeros: 3

Type of Zeros: 1 Real, 2 Imag.

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Notes
Steps for finding all zeros

Step 1: State the number and type of zeros by using the degree and graph of the function.

Step 2: Find as many zeros as possible in the calculator.

Step 3: Use synthetic division to simplify to a quadratic (x^2)

Step 4: Use the quadratic formula, factoring, or solve to find all remaining zeros.

Recall
The Discriminant and the Quadratic Formula

You can determine the number and type of solutions of a quadratic by evaluating the **discriminant.** Discriminant = $(b)^2 - 4ac$

If the discriminant is.....

POSITIVE: There are 2 Real solutions.

NEGATIVE: There are 2 Imagin. solutions.

ZERO: There is one real solution.

The Quadratic Formula - Steps $x = \frac{-b \pm \sqrt{(b)^2 - 4(a)(c)}}{2(a)}$

1) Put your equation in standard form. 2) Identify a, b, and c.

3) Calculate the discriminant. 4) Substitute into the formula and simplify.

Examples

a) State the number and type of zeros (# of real and/or # of imaginary). Find the discriminant when necessary.
b) Use synthetic division to prove x-intercepts and find the remaining zeros (use quadratic formula when necessary).

1) $f(x) = x^3 - 3x^2 - 15x + 125$

Number of Zeros: 3

Types of Zeros: 1 Real, 2 Imag.

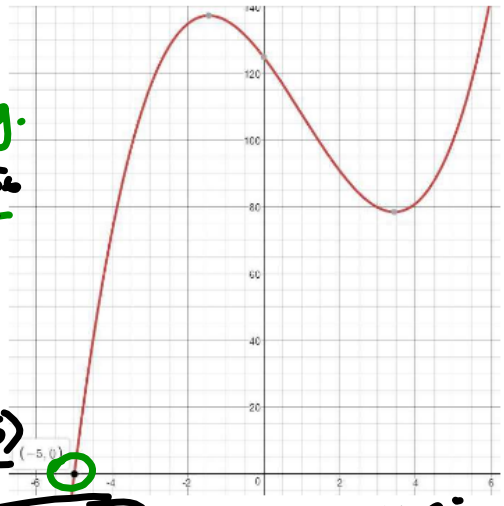
Discriminant: -36

Zeros: $x = -5, \frac{8+i\sqrt{36}}{2}, \frac{8-i\sqrt{36}}{2}$

$-5 \mid 1 \quad -3 \quad -15 \quad 125$
$\quad\quad\downarrow \quad -5 \quad 40 \quad -125$
$\quad\quad 1 \quad -8 \quad 25 \quad \mid 0$
$\quad\quad a \quad b \quad c$

$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(25)}}{2(1)}$

$x = \frac{8 \pm \sqrt{-36}}{2} = \frac{8 \pm i\sqrt{36}}{2}$



$4 \pm 3i$

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Examples

a) State the number and type of zeros (# of real and/or # of imaginary). Find the discriminant when necessary.
b) Use synthetic division to prove x-intercepts and find the remaining zeros (use quadratic formula when necessary).

2) $f(x) = x^2 - 4x + 1$

Number of Zeros: 2

Types of Zeros: 2 Real

Discriminant: 12

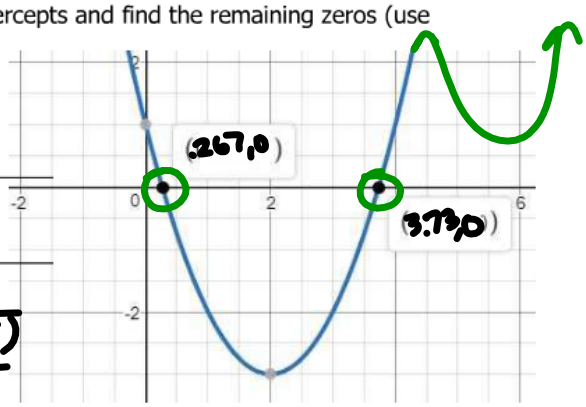
Zeros: $\frac{4 \pm \sqrt{12}}{2}$

$a=1$
$b=-4$
$c=1$

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)}$

$x = \frac{4 \pm \sqrt{12}}{2}$

$x = 0.267, 3.73$



3) $f(x) = x^4 - 7x^2 + 12$

Number of Zeros: 4

Types of Zeros: 4 Real

Discriminant: _____

Zeros: $x=2, x=-2, \sqrt{3}, -\sqrt{3}$

2	1	0	-7	0	12
		2	4	-6	-12
-2	1	2	-3	-6	0
		-2	0	6	X
	1	0	-3	0	

$x^2 \quad x \quad c$

$x^2 - 3 = 0$

$x^2 = 3$

$x = \pm\sqrt{3}$

$x = \frac{-(0) \pm \sqrt{(0)^2 - 4(1)(-3)}}{2(1)}$

$x = \frac{0 \pm \sqrt{12}}{2}$