Warm up:

Solve the polynomials:

1. $y = x^4 - 81$

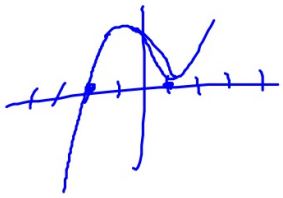
$= (x^2 - 9)(x^2 + 9)$

$(x + 3)(x - 3)$ → $x = 3, -3, 3i, -3i$

$x = \frac{0 \pm \sqrt{0 - 4(9)}}{2} = \frac{\pm\sqrt{-36}}{2}$

$= \pm\frac{6i}{2} = \pm 3i$

2. $x^3 - 3x + 2$



	1	0	−3	2	−2 ✓
		−2	4	−2	
1	1	−2	1	0	1 ✓
		1	−1		
	1	−1	0		

$x - 1 = 0$ → $x = 1, 1, -2$

(swoobat)

Objective: SWBAT write polynomials from a list of given roots

Agenda:

- Warm Up
- Quiz
- Notes
- Practice
- Reflection

Quiz

Max. Time: 40 min

Remark about Writing Polynomials and Uniqueness

We know that a quadratic function has 2 roots, but the standard form of a quadratic equation is $Ax^2 + Bx + C$ (3 terms).

So along with a list of roots, we would need another point to write a unique polynomial. Instead, we are going to focus on the simplest one we can write.

Notes: Writing Polynomials

Steps:

1. Set the roots equal to x
2. Move the numbers over so you have factors all equal to zero (and no fractions)
3. Multiply the factors together
4. Simplify and set the expression equal to y

example:

1, 0, -2, 1/2

$x = 1 \quad x = 0 \quad x = -2 \quad x = 1/2$

$x - 1 = 0, \; x = 0, \; x + 2 = 0, \; 2x - 1 = 0$

$x(x-1)(x+2)(2x-1) = 0$

$x(x^2 + x - 2)(2x - 1) = 0$

$x(2x^3 + 2x^2 - 4x - x^2 - x + 2) = 0$

$2x^4 + 2x^3 - 4x^2 - x^3 - x^2 + 2x = 0$

$2x^4 + x^3 - 5x^2 + 2x = 4$

Examples

a) 1, 2, 2

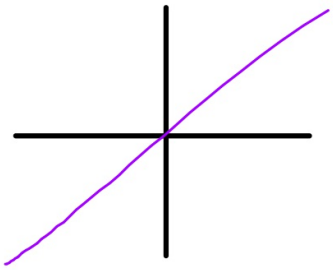
b) 3/2, -1, 0, 4

Graphing Polynomials by Roots

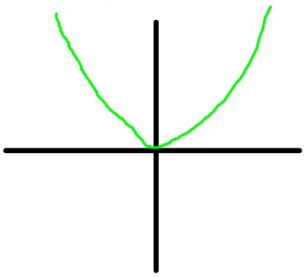
-1, 1, 2, 2

What do these functions look like at their x- intercepts?

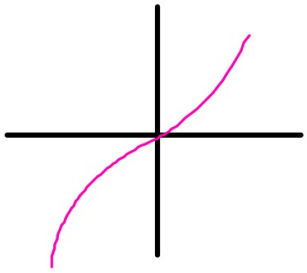
$y = x$



$y = x^2$



$y = x^3$



This is also what a single, double, or triple root looks like.

Practice

Reflection

How does the graph of a function change if a root shows up more than once?