Objective: SWBAT write a polynomial function given the roots or a graph.

Kickoff

Fill out the participation paper on your desk and find all possible zeros for #4 on yesterdays classwork!

Finding a Polynomial Function Given the Roots

Try This: Find all the real zeros of $f(x) = x^3 - x^2 - 2x$

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

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

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

Complete the square:

$f(x) = x^2 + 8x - 3$

$x^2+8x-3=0$

$x^2+8x \overset{+16}{=} 3+16$

$\sqrt{(x+4)^2} = \sqrt{19}$

$x+4 = \pm\sqrt{19}$

$-4 \quad -4$

$x = -4 \pm \sqrt{19}$

When given the roots of the equation, you need to work backwards from our Try This!! (use backward factoring!)

Examples: Find the polynomial function given the rational roots:

1) {0, 2, -1}

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

$-2 \quad +1$

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

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

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

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

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

Standard

2) {-5, ¼, 0}

$x=-5 \quad x=\frac{3}{4} \quad x=0$

$+4 \quad \cdot 4$

$x+5=0 \quad 4x=3$

$4x-3=0$

$f(x) = (x+5)(4x-3)x$

factored form

3) {-½, 3, 3}

$x=-\frac{1}{2} \quad x=3 \quad x=3$

$\cdot 2 \quad \cdot 2$

$x-3=0 \quad x-3=0$

$2x=-1$

$+1 \quad +1$

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

4) $\{-1, 2 \pm \sqrt{11}\}$

$x=-1 \quad x=2\pm\sqrt{11}$

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

$(x-2)^2 = (\pm\sqrt{11})^2$

$x^2-4x+4 = 11$

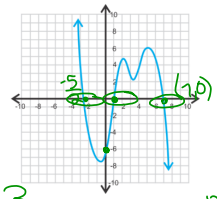
$-11 \quad -11$

$x^2-4x-7=0$

$(x+1)(x^2-4x-7)$

$x^3-3x^2-11x-7$

Directions: Given the graph, determine a possible polynomial equation.



Degree: 3

Roots: $-5/2, 1, 7$

f(0) = -6

Leading Coefficient: $-101/35$

Factored form: $(2x+5)(x-1)(x-7)$

Find K:

$(x = -\frac{5}{2})2$

$2x = -5$

$+5 \quad +5$

$(2x+5)$

$f(x) = k(2x+5)(x-1)(x-7)$

$-6 = k(2(0)+5)(0-1)(0-7)$

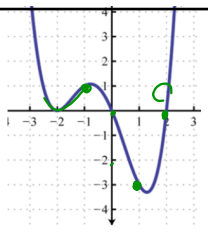
$-6 = k\,35$

$\frac{-6}{35} = k$

$f(x) = \frac{-6}{35}(2x+5)(x-1)(x-7)$

$\frac{-6}{35}(2x)(x)(x)$

$-\frac{12}{35}x^3$



$(x+2)^2$

Degree:

Roots: $-2, -2, 2$

f(0) =

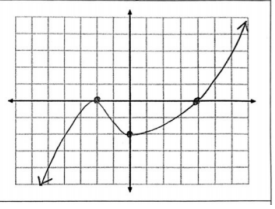
Leading Coefficient:

Factored form: $(x+2)^2(x-2)$

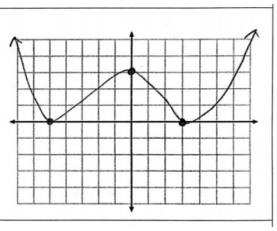
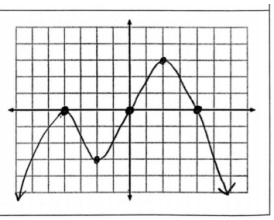
Find K:

$f(x) = k\,x(x+2)^2(x-2)$

$1 = k(-1)(-1+2)^2(-1-2)$

Equation	Graph
1)	

2)



3)