February 05, 2020

5.1 - Day 3 - Graphing Polynomials and Zeros

Multiplicity and x-Intercepts

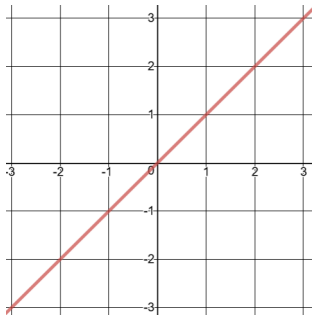
If r is a zero of **even multiplicity**, then the graph **touches** the x-axis **and turns around** at r. If r is a zero of **odd multiplicity**, then the graph **crosses** the x-axis at r. Regardless of whether the multiplicity of a zero is even or odd, graphs tend to flatten out near zeros with multiplicity greater than one.

Examples:

Single Zero (Mult. 1)

"Straight through"

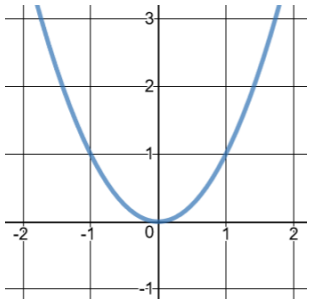
$f(x) = x$



Double Zero (Mult. 2)

"Bounce back"

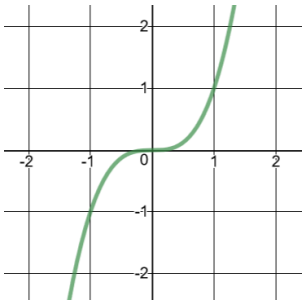
$g(x) = x^2$



Triple Zero (Mult. 3)

"Snake through"

$h(x) = x^3$



Ex1. Find the zeros the function. State multiplicity of multiple zeros. Then sketch a graph of the function.

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

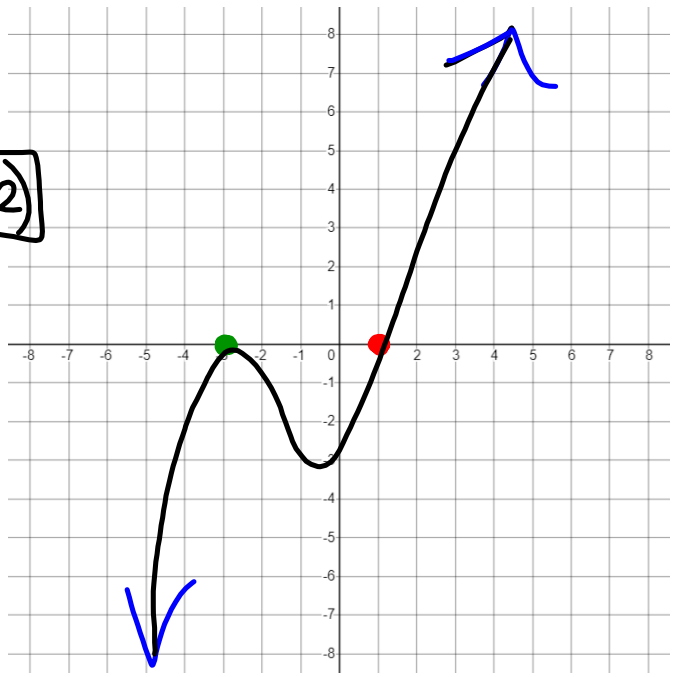
$x = 1$

$x = -3$ (mult. 2)

Degree: odd

Leading Coef.: positive

End Behavior: Down/Up



Ex2. Find the zeros the function. State multiplicity of multiple zeros. Then sketch a graph of the function.

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

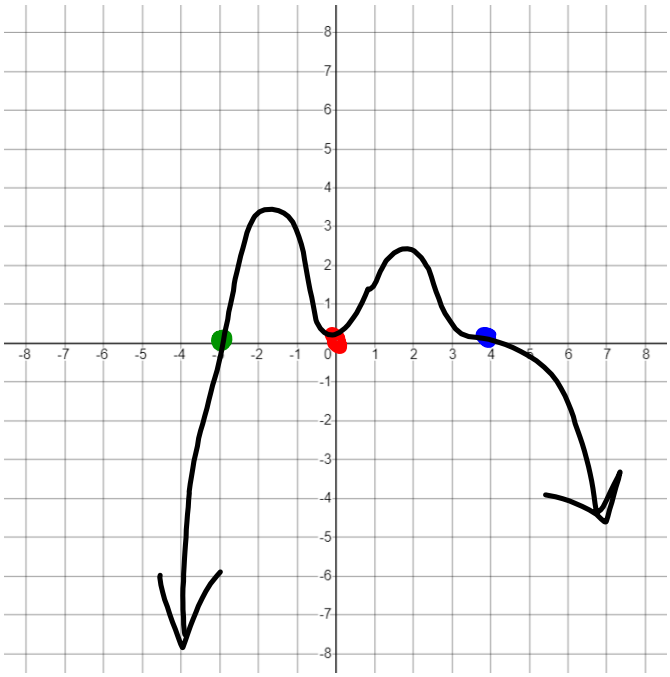
$x = 0$ (mult. 2)

$x = -3$

$x = 4$ (mult. 3)

even, neg.

E.B.: Down/Down



Ex3. Find the zeros the function. State multiplicity of multiple zeros. Then sketch a graph of the function.

$f(x) = -x^3 + x^2 + 6x$

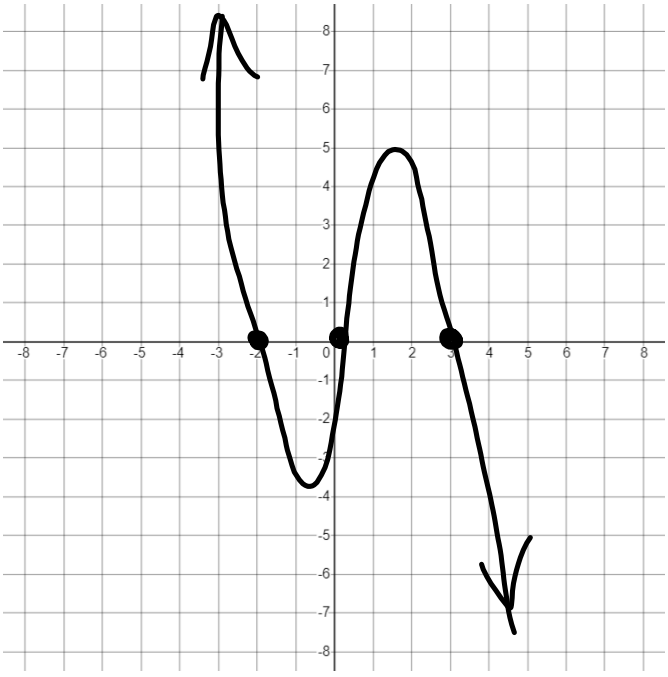
$-x(x^2 - x - 6)$

$-x(x-3)(x+2)$

$x = 0, 3, -2$

odd, neg.

E.B.: Up/Down



Ex5. Find the zeros the function. State multiplicity of multiple zeros. Then sketch a graph of the function.

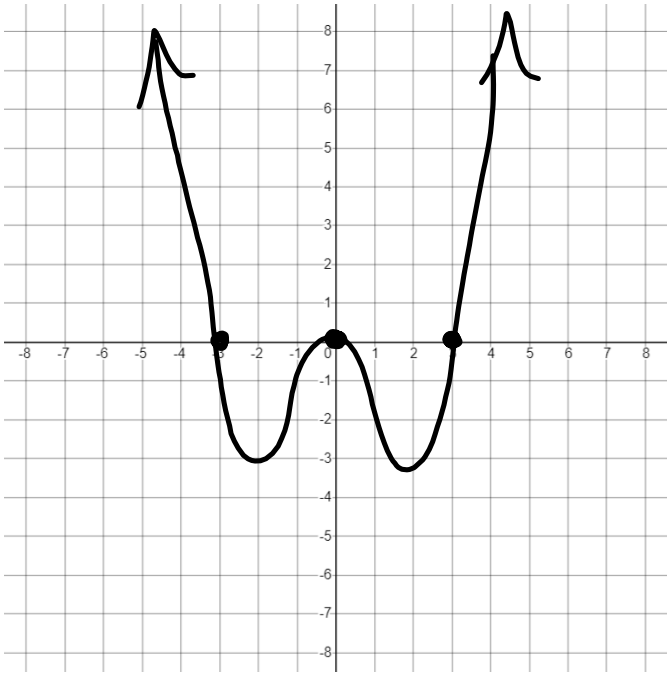
$f(x) = 6x^4 - 54x^2$

$6x^2(x^2-9)$

$6x^2(x+3)(x-3)$

$x = 0$ (mult. 2), $-3, 3$

E.B.: Up/Up

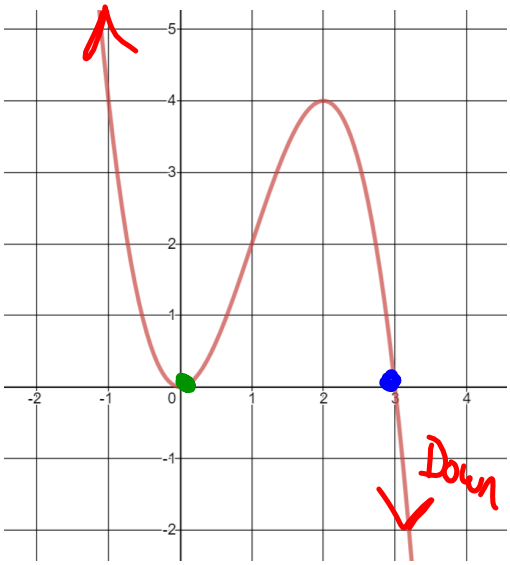


Ex.6 Given the following graph, write a polynomial function in **standard form** for it.

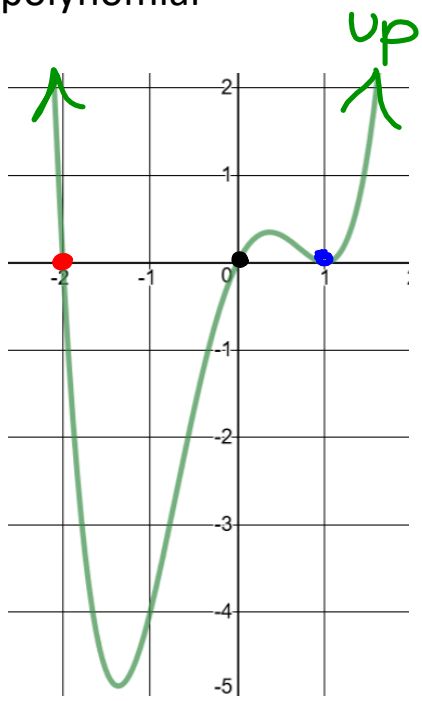
$-x^2 \cdot (x-3)$

$-x^3+3x^2$

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



Ex.7 Given the following graph, write a polynomial function in **standard form** for it.



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

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

$x^4 - 2x^3 + 1x^2 + 2x^3 - 4x^2 + 2x$

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