

Finding Zeros and Sketching the Graphs of Polynomials

Steps for Sketching the Graphs of Polynomials

1. _____

2. _____

3. _____

4. _____

Zeros with Multiplicity k:

Zeros that are repeated k times have a multiplicity of k.

If k is even, the graph _____.

If k is odd, the graph _____.

Examples: Find the zeros with their multiplicity.

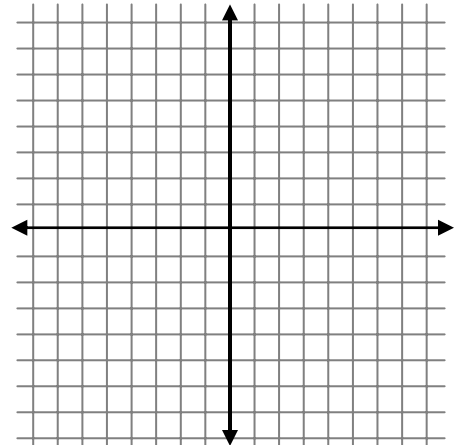
1. $f(x) = 2x + 1(x - 3)^2$

2. $f(x) = x^3 + 2^2(2x - 5)$

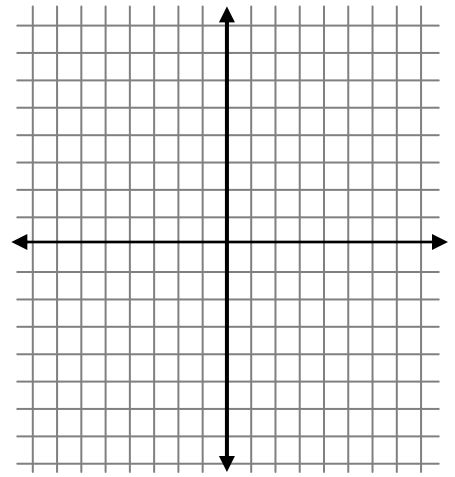
Real Zeros of Polynomial Functions and Sketching

Examples: Find the real zeros, the y-intercept, end behavior and sketch.

3. $f(x) = 2x^4 + 7x^3 - 4x^2 - 27x - 18$; $f(2) = 0$ and $f(-3) = 0$



4. $f(x) = x^4 - 4x^3 - 15x^2 + 58x - 40$; $f(5) = 0$ and $f(-4) = 0$

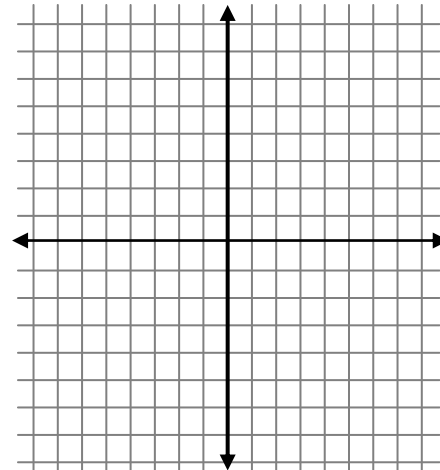
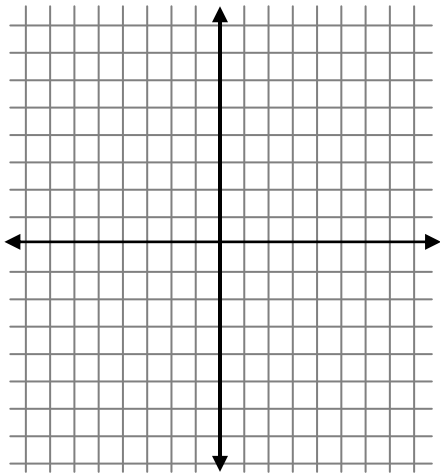


Real and Complex Zeros of a Polynomial Functions

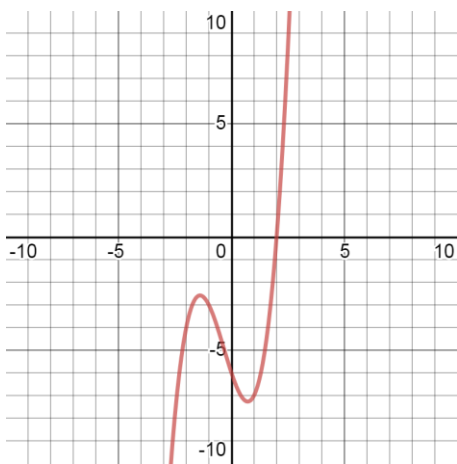
Examples: Find the zeros, the y-intercept, end behavior, and give the factored form, and sketch.

5. $f(x) = x^3 + 4x$

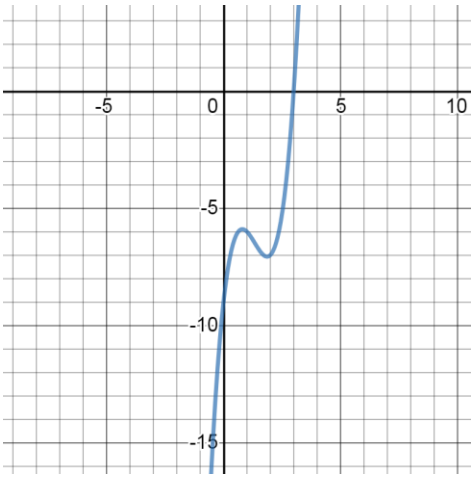
6. $f(x) = x^5 + x^3 + 2x^2 - 12x + 8$; $f(1) = 0$ and $f(-2) = 0$



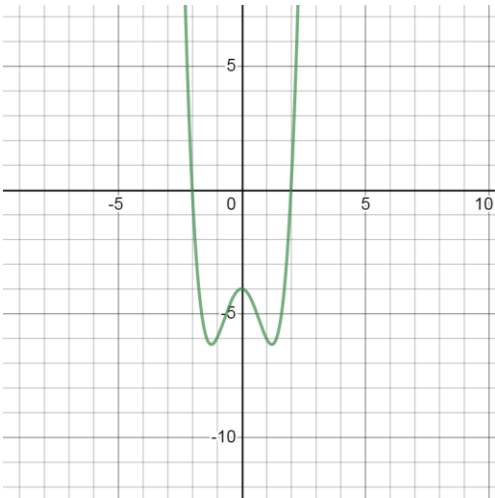
7. What are the real and complex zeros of the polynomial shown in the graph: $f(x) = x^3 + x^2 - 3x - 6$?



8. What are the real and complex zeros of the polynomial shown in the graph: $f(x) = 2x^3 - 8x^2 + 9x - 9$

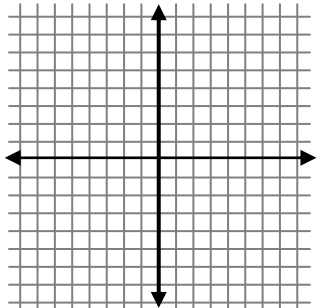
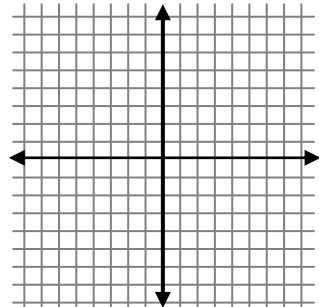
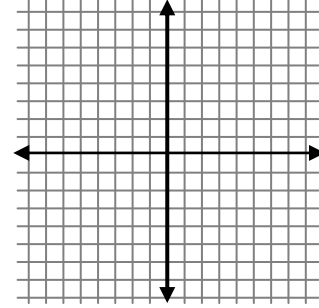
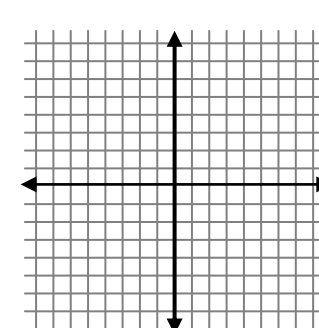


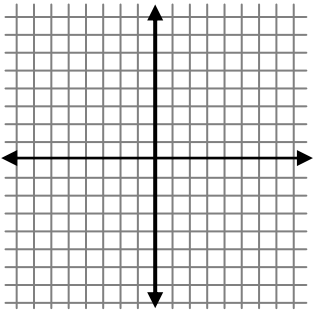
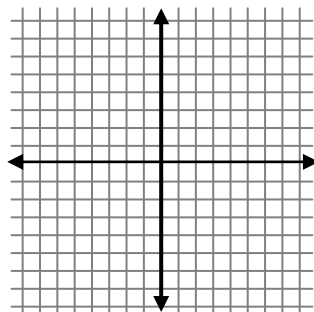
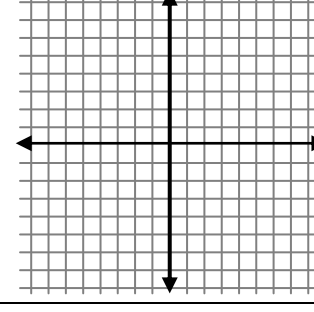
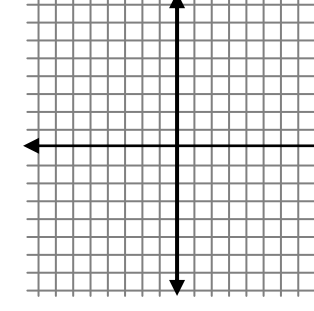
9. What are the real and complex zeros of the polynomial shown in the graph: $f(x) = x^4 - 3x^2 - 4$



Sketching Polynomials of Higher Degree

The Fundamental Theorem of Algebra

Function	Zeros	y-intercept	End Behavior	Sketch the Graph
1. $f(x) = (x + 1)(x - 2)$			$As x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ $As x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	
2. $f(x) = x(x + 1)^2$			$As x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ $As x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	
3. $f(x) = (x + 1)^2(x - 2)^2$			$As x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ $As x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	
4. $f(x) = x + 1$			$As x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ $As x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	

Function	Zeros	y-intercept	End Behavior	Sketch the Graph
5. $f(x) = (x + 1)^2$			As $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ As $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	
6. $f(x) = (x + 1)^3$			As $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ As $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	
7. $f(x) = x - 3^2(x + 5)$			As $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ As $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	
8. $f(x) = -\frac{1}{2}x(x + 2)^3$			As $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ As $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	
9. $f(x) = x^2(x + 1)^2(x - 1)$			As $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$ As $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$	