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Algebra II

Analyzing Graphs of Polynomial Functions

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Learning Targets

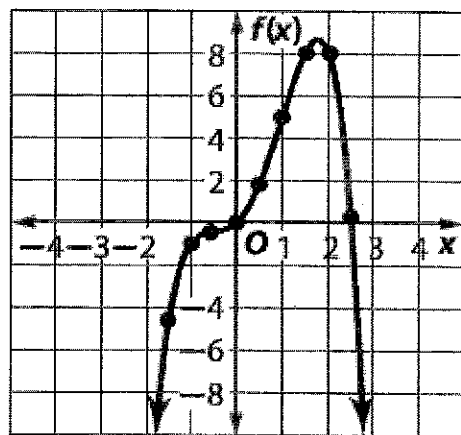
I can graph polynomial functions and locate their zeros.

I can find the relative maxima and minima of polynomial functions.

Graph of a Polynomial Function

Graph $f(x) = -x^4 + x^3 + 3x^2 + 2x$ by making a table of values.

x	$f(x)$	x	$f(x)$
-2.5	-40.9	0.5	1.8
-2.0	-16	1.0	5
-1.5	-4.7	1.5	8.1
-1.0	-1	2.0	8
-0.5	-0.4375	2.5	0.3125
0.0	0	3.0	-21

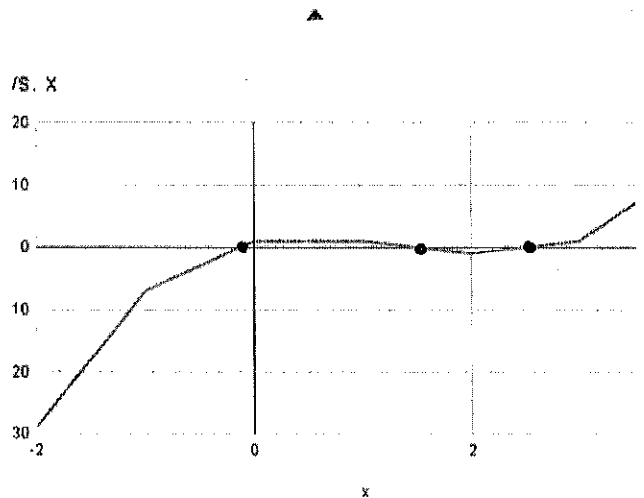


Locate Zeros of a Function

Location Principle: If the graph is below the x-axis for some x-value a and the graph is above the x-axis for some x-value b , then the graph must have crossed the x-axis at some x-value between a and b . The point where the x-axis is crossed is a real zero.

Determine the consecutive integer values of x between which each real zero of $f(x) = x^3 - 4x^2 + 3x + 1$ is located. Then draw the graph.

x	$f(x)$
-2	-29
-1	-7
0	1
1	1
2	-7
3	1
4	13



Looking at the table above you'll notice that where $x=0$, 2 , and 3 the y -value changes sign (positive to negative or negative to positive). That means there is a real zero between those x -values.

Relative Maximum at Point A: the graph increases as it approaches A and decreases as it moves away from A.

Relative Minimum at Point B: the graph decreases as it approaches B and increases as it moves away from B.

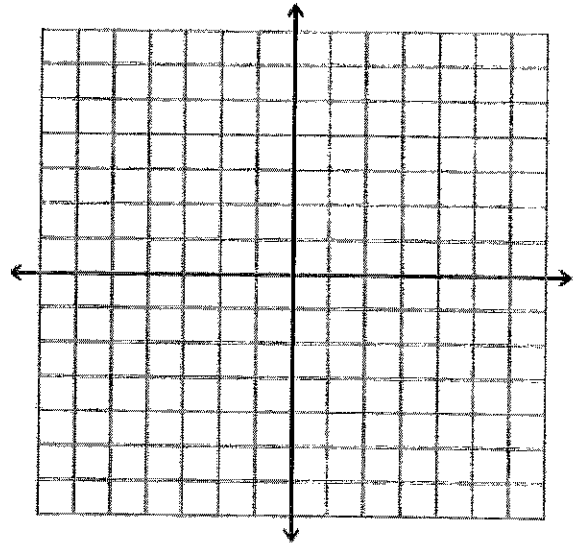
Extrema: the maximum and minimum values of a function

Turning Points: sometimes called relative maximum and minimums, the graph of a polynomial function of degree n has at most $n - 1$ turning points.

Maximum and Minimum Points

Graph $f(x) = x^3 - 4x^2 - 2x + 3$. Estimate the x-coordinates at which the relative maxima and relative minima occur.

x	$f(x)$	Important things
-2	-17	
-1	0	Zero
0	3	Indicates a relative max
1	-2	
2	-9	
3	-12	Indicates a relative min
4	-5	Zero between 4 and 5
5	18	



(c) vs. x

