Chapter 5
Polynomials and Polynomial Functions

Key Domains:
- -interpreting functions
- -arithmetic with polynomials and rational functions
- -the complex number system

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Section 5-1
Polynomial Functions

Students will be able to:
- -classify polynomials
- -graph polynomial functions and describe end behavior

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Solve the Solve It, Getting Ready on pg. 280

-What is the 8th term in the first column?

Using patterns of differences will help to determine the degree of a polynomial.

-sequence in the 1st column relate to the values of a particular polynomial function.

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A polynomial function has distinguishing 'behaviors'.
- -Its algebraic form tells you something about its graph.
- -Its graph tells you something about its algebraic form.

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Monomial-
- **-Examples**

Degree of the monomial-
- **4x**
- **$-5a^3$**

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Polynomial:
- **a monomial or sum of monomials**

Ex:

Degree of Polynomial(in one variable)
- **-greatest degree among its monomial terms.**
- **Ex:**

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A polynomial with the variable x defines a polynomial function of x.

Standard Form of a Polynomial Function: arranges terms by degree in descending order

$f(x) = -4x^3 + 6x^2 - x + 2$

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Polynomials can be classified by number of terms and by degree.

Degree	Name Using Degree	Polynomial Example	Number of Terms	Name Using Number of Terms
0	constant	7	1	monomial
1	linear	2x - 8	2	binomial
2	quadratic	$-3x^2$	1	monomial
3	cubic	$x^3 + 2x - 4$	3	trinomial
4	quartic	$x^4 - x$	2	binomial
5	quintic	$-2x^5 + 3x^4 - x^3 + x$	4	polynomial of 4 terms

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Write the polynomial in standard form. Classify it based on degree and number of terms.

1. $-2 + x^4 - 3x^2 + 5x^3$

2. $3 + x^5$

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The degree of a polynomial function affects the shape of its graph and determines the maximum number of turns.

It also effects end behavior, or the directions of the graph to the far left and far right.

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Graph: $y = 2x^4 + 3x^3 - 1$

4th Degree

End behavior: increasing to left, increasing to rt.

Turning Points: 3

Decreasing and Increasing Intervals:

Read left to right

decrease → $-\infty < x < -1.1$, $0 < x < .25$

increase → $-1.1 \le x \le 0$, $.25 \le x < \infty$

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You can tell the end behavior of a function by looking at the leading term ax^n

$2x^4$

	n Even	n Odd
a Positive	Up and Up	Down and Up
a Negative	Down and Down	Up and Down

Describe the end behavior

$f(x) = -2x^3 + 6$ up left, down rt.

$f(x) = x^4 + x^2 - 10$ up left, up rt

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

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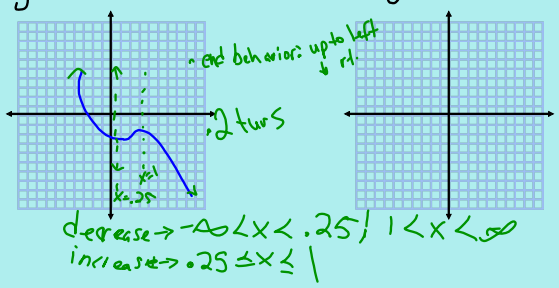
Graph. Describe the end behavior, turning points, and increasing/decreasing intervals.

$y = -x^3 + 2x^2 - x - 2$



decrease → $-\infty < x < .25$; $1 < x < \infty$

increase → $.25 \le x \le 1$

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Look at your Getting Ready problem.

The 3rd difference was a constant, therefore the degree of the polynomial function that generates that data is a degree 3.

If the first differences are constant, it is a 1st degree polynomial (monomial); if the second differences are constant, it is a 2nd degree polynomial (binomial), and so on.

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Hwk: pg. 285 - 287
 # 8 - 36 (4th), 38, 40, 46 - 50 evens, 54

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