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| **Polynomial Functions (5.1)** | **Math 98** |

Graph the following functions on your graphing calculator and observe differences between polynomial and non-polynomial functions.

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|  | **Polynomial Functions** | **Non-polynomial Functions** |  |
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**Polynomial Definitions and Vocabulary**

* A number or variable raised to a power or a product of numbers and variables raised to powers is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is one or more terms combined with addition and subtraction.  The powers must be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a term is the sum of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a term is the constant (or number) of the term.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_ of a polynomial is the term of highest degree.  Its coefficient is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a polynomial is the degree of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the polynomial.  
    
  Example:
* Types of polynomials (by number of terms):
  + A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a polynomial with one term.
  + A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a polynomial with two terms.
  + A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a polynomial with three terms.
* Types of polynomials (by degree):
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if it has degree 0 or 1
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if it has degree 2
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if it has degree 3
* The order of a polynomial:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is when the exponents of one variable \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from left to right in the polynomial.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is when the exponents of one variable \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from left to right in the polynomial.

Example 1: For each polynomial, find the degree of each term, the degree of the polynomial, the leading term, and the leading coefficient.

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| Term:  Degree:   Leading term:  Leading Coefficient:  Degree of the polynomial: | Term:  Degree:   Leading term:  Leading Coefficient:  Degree of the polynomial: |

Example 2: Arrange the polynomial in both ascending and descending order.

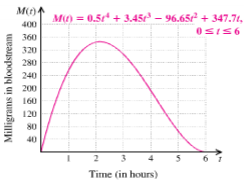
                Ascending:  
  
                Descending:

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has the form  where each  is a constant and *n* is a non-negative integer.

Example 3: Find  for  by hand, evaluating with the calculator, using the table, and by looking at the graph.

Example 4: Ibuprofen is a medication used to relieve pain. We can estimate the number of milligrams of ibuprofen in the bloodstream *t* hours after 400 mg of medication has been swallowed with the polynomial function .

1. How many milligrams of ibuprofen are in the bloodstream 2 hours after 400 mg has been swallowed?
2. Use the graph to find and interpret 



Fact about polynomials: The domain of the previous example was limited to six hours because of the application. However, the *domain* of every polynomial is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (provided there aren’t restrictions added on).

Example 5: Find the domain and range of the following polynomials

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| Domain:  Range: | Domain:  Range: |

Example 6: Combine like terms

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Example 7: Add or subtract polynomials

1. 
2. 
3. 
4. 
5. 
6. 