GUIDED NOTES – 5.2 POWER FUNCTIONS AND POLYNOMIAL FUNCTIONS

LEARNING OBJECTIVES

In this section, you will:

- Identify power functions.
- Identify end behavior of power functions.
- Identify polynomial functions.
- Identify the degree and leading coefficient of polynomial functions.

IDENTIFYING POWER FUNCTIONS

- A power function is a function that can be represented in the following form:

  $f(x) =$ _____, where k and p are real numbers, and k is known as the coefficient.

Try It: Read Example 1 in the text, then answer the following.

Which functions are power functions?

$f(x) = 2x^2 \cdot 4x^3$ $\qquad$ $g(x) = -x^5 + 5x^3$ $\qquad$ $h(x) = \frac{2x^5-1}{3x^2+4}$

IDENTIFYING END BEHAVIOR OF POWER FUNCTIONS

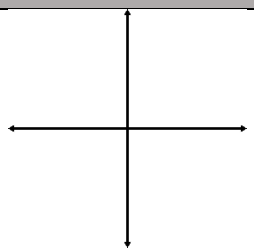
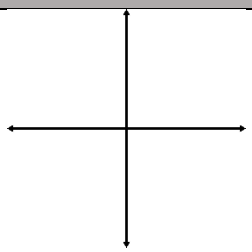
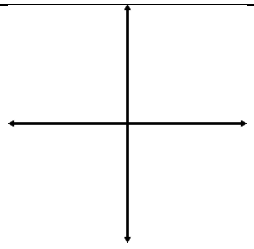
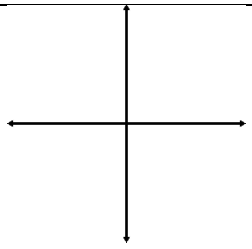
- Write out the 3 step process for identifying the end behavior, given a power function $f(x) = kx^n$ where n is a non-negative integer.

1.

2.

3.

*Use **Figure 4** in you textbook section to fill out the table below.*

	Even Power	**Odd Power**
Positive Constant $k > 0$	 $x \to -\infty, f(x) \to$ _____ and $x \to \infty, f(x) \to$ _____	 $x \to -\infty, f(x) \to$ _____ and $x \to \infty, f(x) \to$ _____
Negative Constant $k < 0$	 $x \to -\infty, f(x) \to$ _____ and $x \to \infty, f(x) \to$ _____	 $x \to -\infty, f(x) \to$ _____ and $x \to \infty, f(x) \to$ _____

Try It: Read Examples 2 and 3 in the text, then answer the following.

Describe in words and symbols the end behavior of $f(x) = -5x^4$.

IDENTIFYING POLYNOMIAL FUNCTIONS

Study the box in your textbook section titled "polynomial functions."

- Let n be a non-negative integer. A _____ is a function that can be written in the form

$$f(x) = a_n x^n + \cdots + a_2 x^2 + a_1 x + a_0$$

This is called the _____ form of a polynomial function.

IDENTIFYING THE DEGREE AND LEADING COEFFICIENT OF A POLYNOMIAL FUNCTION

- The _____ is the term containing the highest power of the variable. The

  _____ is the coefficient of the leading term.

- Write out the 3 step process for identifying the degree and leading coefficient, given a polynomial function.

  1.

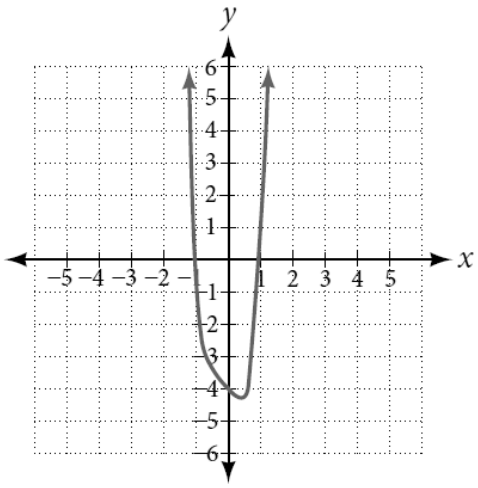
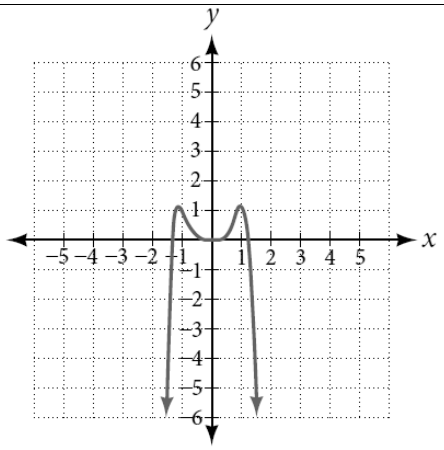
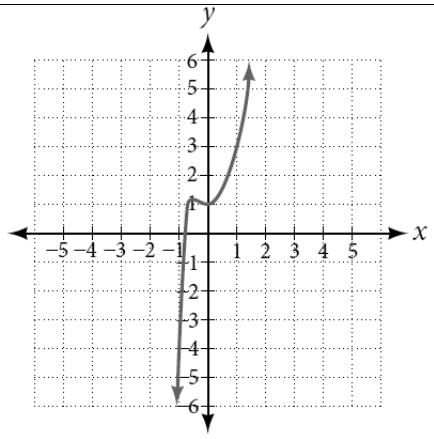
  2.

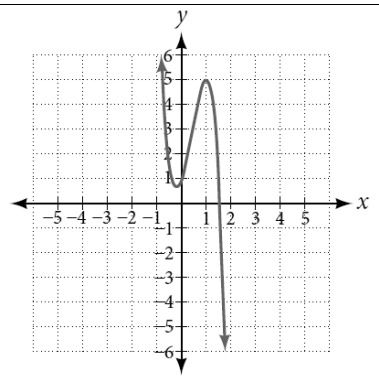
  3.

Try It: Read Example 5 in the text, then answer the following.

Identify the degree, leading term, and leading coefficient of the polynomial $f(x) = 4x^2 - x^6 + 2x - 6$.

*Use **Table 3** in your textbook section to complete the table below.*

Polynomial Function	Leading Term	Graph of Polynomial Function
$f(x) = 5x^4 + 2x^3 - x - 4$		
$f(x) = -2x^6 - x^5 + 3x^4 + x^3$		
$f(x) = 3x^5 - 4x^4 + 2x^2 + 1$		

$f(x) = -6x^3 + 7x^2 + 3x + 1$		

Try It: Read Example 6 in the text, then answer the following.

Describe the end behavior, and determine a possible degree of the polynomial function in **Figure 8**.

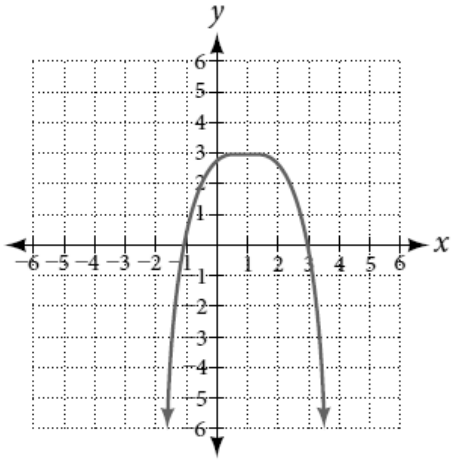


Figure 8

Try It: Read Example 7 in the text, then answer the following.

Given the function $f(x) = 0.2(x-2)(x+1)(x-5)$, express the function as a polynomial in general form and determine the leading term, degree, and end behavior of the function.

Study the box in your textbook section titled "intercepts and turning points of polynomial functions."

- A _____ of a graph changes direction from increasing to decreasing or decreasing to increasing.

- Write out the 2 step process for determining the intercepts, given a polynomial function.

    1.

    2.

Try It: Read Examples 8 and 9 in the text, then answer the following.

Given the polynomial function $f(x) = 2x^3 - 6x^2 - 20x$, determine the y- and x-intercepts.

Study the box in your textbook section titled "intercepts and turning points of polynomials."

- A polynomial of degree n will have, at most, _____ x-intercepts and _____ turning points.

Try It: Read Example 10 in the text, then answer the following.

Without graphing the function, determine the maximum number of x-intercepts and turning points for $f(x) = 108 - 13x^9 - 8x^4 + 14x^{12} + 2x^3$.

Try It: Read Example 11 in the text, then answer the following.

What can we conclude about the polynomial represented by the graph shown in **Figure 14** based upon is intercepts and turning points?

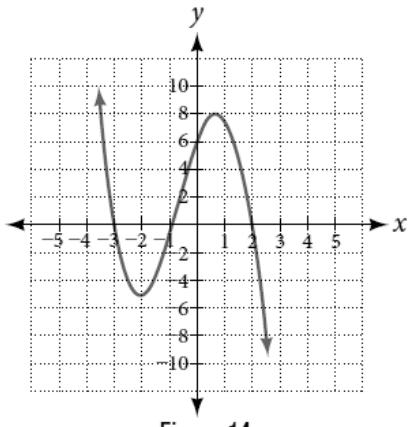


Figure 14

Try It: Read Example 12 in the text, then answer the following.

Given the function $f(x) = 0.2(x-2)(x+1)(x-5)$, determine the local behavior.