The End Is in Sight

What happens when you evaluate polynomial functions for very large positive numbers and very large negative numbers? How does that manifest on the graph? Let's investigate!

1. Without evaluating, determine if each expression will be positive or negative.
   a. 100^5
   b. $(-100)^4$
   c. $-2 \cdot 800^2$
   d. $(-230)^{17}$
   e. $-6 \cdot (-900)^5$

2. Consider $f(x) = x^3 + 5$.
   a. What happens to the y-values as the x-values get bigger and bigger? Try a few values to investigate.

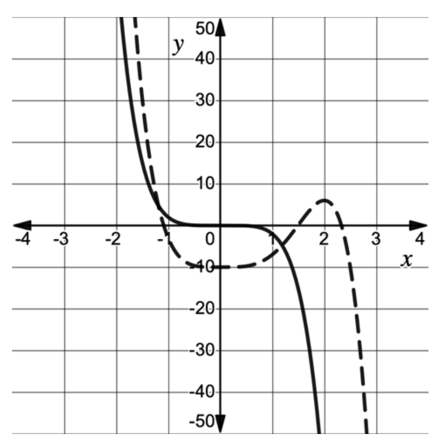
   b. What happens to the y-values as the x-values decrease without bound? Try a few values to investigate.

3. Consider $g(x) = 3x^4 - x^3 + 5$.
   a. What happens to the y-values as the x-values get bigger and bigger? Try a few values to investigate.

   b. What happens to the y-values as the x-values decrease without bound? Try a few values to investigate.

   c. How would your answers to parts a and b change if the function was $g(x) = -3x^4 - x^3 + 5$?

4. The graphs of the functions $g(x) = -2x^5$ and $h(x) = -2x^5 + 5x^4 - 10$ are shown.
   a. Identify which graph is g and which graph is h.
   b. Compare the end behavior of the two graphs.



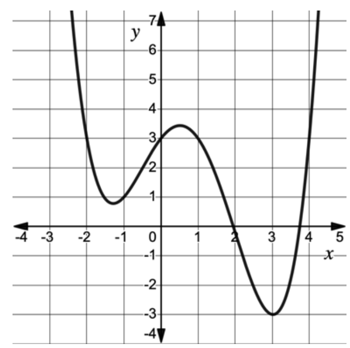
5. Which term in the polynomial seems to have the biggest impact on the end behavior of the graph? Why do you think this is?

Lesson 2.4 – Polynomial Functions and End Behavior

QuickNotes

Check Your Understanding

1. Use limit notation to describe the end behavior of the graph shown.



2. Is it possible for this graph to have a degree of 5? Why or why not?

3. Which of the following terms, when added to the given polynomial, will change the end behavior? Check all that apply.

$$y = -2x^7 + 5x^6 - 24$$

- ☐ $-x^8$
- ☐ $-3x^5$
- ☐ $5x^7$
- ☐ 1000
- ☐ -300

4. Use limit notation to describe the end behavior of $y = \frac{1}{6}(x-9)(x+4)^2$.

5. (Multiple Choice) The graph of $f(x) = 8x^3 - 5x^6 + 2x^2 - 24$ has the same end behavior as

(A) $y = x^3$ (B) $y = -x^6$ (C) $y = x^2$ (D) $y = 5x^6$