Polynomial End Behavior Introduction Name: _____

1. Go to www.desmos.com and click on start graphing
2. Answer the following questions about the function $f(x) = x^4 + 2x^3 + 5$:
   a. Is the polynomial function written in standard form? If not, write the function in standard form. _____
   b. What is the sign of the leading coefficient? _____
   c. What is the degree of the leading coefficient? _____
   d. Graph $f(x) = x^4 + 2x^3 + 5$
   e. Make two observations about the graph (x-intercepts, y intercepts, opens up, opens down, curvy, straight, etc):
      1. _____
      2. _____
   f. Describe the end behavior of the function_____
      _____
   g. Summarize your findings for $f(x) = x^4 + 2x^3 + 5$ in the chart below.

Sign of leading coefficient	Degree of leading Coefficient	End Behavior as $x \longrightarrow \infty$	End Behavior as $x \longrightarrow -\infty$
		$y \longrightarrow$	$y \longrightarrow$

3. Answer the following questions about the function $f(x) = -3x^6 + x^4 - 5x^3 + 1$:
   a. Is the polynomial function written in standard form? If not, write the function in standard form. _____
   b. What is the sign of the leading coefficient? _____
   c. What is the degree of the leading coefficient? _____
   d. Graph $f(x) = -3x^6 + x^4 - 5x^3 + 1$
   e. Make two observations about the graph (x-intercepts, y intercepts, opens up, opens down, curvy, straight, etc):
      1. _____
      2. _____
   f. Describe the end behavior of the function_____
      _____
   g. Summarize your findings for $f(x) = -3x^6 + x^4 - 5x^3 + 1$ in the chart below.

Sign of leading coefficient	Degree of leading Coefficient	End Behavior as $x \longrightarrow \infty$	End Behavior as $x \longrightarrow -\infty$
		$y \longrightarrow$	$y \longrightarrow$

4. Answer the following questions about the function $f(x) = 2x^5 - 3x^2 + 4$:
   a. Is the polynomial function written in standard form? If not, write the function in standard form. _____
   b. What is the sign of the leading coefficient? _____
   c. What is the degree of the leading coefficient? _____
   d. Graph $f(x) = 2x^5 - 3x^2 + 4$
   e. Make two observations about the graph (x-intercepts, y intercepts, opens up, opens down, curvy, straight, etc):
      1. _____
      2. _____
   f. Describe the end behavior of the function_____
      _____
   g. Summarize your findings for $f(x) = 2x^5 - 3x^2 + 4$ in the chart below.

Sign of leading coefficient	Degree of leading Coefficient	End Behavior as $x \longrightarrow \infty$	End Behavior as $x \longrightarrow -\infty$
		$y \longrightarrow$	$y \longrightarrow$

5. Answer the following questions about the function $f(x) = -x^3 + 3x^2 + 3x - 2$:
   a. Is the polynomial function written in standard form? If not, write the function in standard form. _____
   b. What is the sign of the leading coefficient? _____
   c. What is the degree of the leading coefficient? _____
   d. Graph $f(x) = -x^3 + 3x^2 + 3x - 2$
   e. Make two observations about the graph (x-intercepts, y intercepts, opens up, opens down, curvy, straight, etc):
      3. _____
      4. _____
   f. Describe the end behavior of the function_____
      _____
   g. Summarize your findings for $f(x) = -x^3 + 3x^2 + 3x - 2$ in the chart below.

Sign of leading coefficient	Degree of leading Coefficient	End Behavior as $x \longrightarrow \infty$	End Behavior as $x \longrightarrow -\infty$
		$y \longrightarrow$	$y \longrightarrow$

6. Use the table below to gather all of your summary data into one table. Then use the table to answer the questions below.

Sign of leading coefficient	Degree of leading Coefficient	End Behavior as $x \longrightarrow \infty$	End Behavior as $x \longrightarrow -\infty$
		$y \longrightarrow$	$y \longrightarrow$
		$y \longrightarrow$	$y \longrightarrow$
		$y \longrightarrow$	$y \longrightarrow$
		$y \longrightarrow$	$y \longrightarrow$

7. Based in the information in the table, how would you predict the end behavior of the polynomial $f(x) = -x^8 + 2x^6 - x^2 - 5$. Explain your reasoning.

   I predict the end behavior will be_____
   _____because
   _____
   _____.

   Graph the polynomial to check your prediction.

8. Based in the information in the table, how would you predict the end behavior of the polynomial $f(x) = 4x^7 + 6x^3 - x + 2$. Explain your reasoning.

   I predict the end behavior will be_____
   _____because
   _____
   _____.

   Graph the polynomial to check your prediction.