Questions on what we've covered of Lesson 5.4 so far?

Open your books to pg.372 and we'll get started in a couple of minutes!

Feb 27-8:47 AM

Polynomial DNA
Key Characteristics of Polynomial Functions

5.4

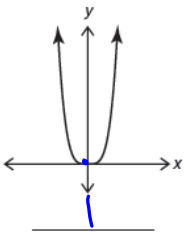
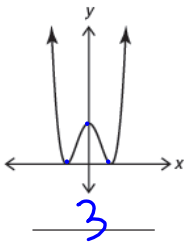
PG.372 IN YOUR BOOK

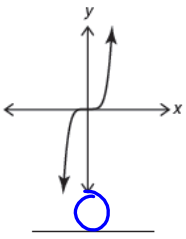
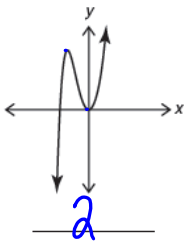
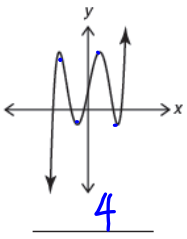
So far in this chapter, you have learned a great deal about polynomial functions. You have learned about minimums, maximums, zeros, end behavior, and the general shapes of their graphs. Now, you will combine all that information to generalize the key characteristics for any degree polynomial.

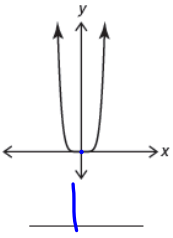
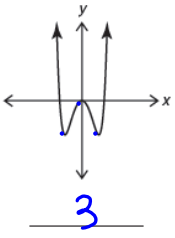
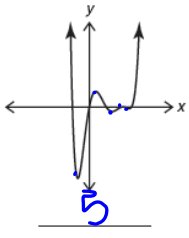
Recall the definition of a relative maximum is the highest point in a particular section of a function's graph, and a relative minimum is the lowest point in a particular section of the graph. Similarly, the **absolute maximum** is the highest point in the entire graph, and the **absolute minimum** is the lowest point in the entire graph. The set of absolute maximums, absolute minimums, relative maximums, and relative minimums may also be referred to as **extrema**. The extrema are also called extreme points and extremum.

PG.373 IN YOUR BOOK

2. Determine the number of extrema in each polynomial.

	$g_1(x) = x^4$	$g_2(x) = x^4 - 3x^2$
4th Degree Polynomials		
Number of Extrema	1	3

	$f_1(x) = x^5$	$f_2(x) = x^5 + 4x^2$	$f_3(x) = x^5 - 5x^3 + 5x + 1.18$
5th Degree Polynomials			
Number of Extrema	0	2	4

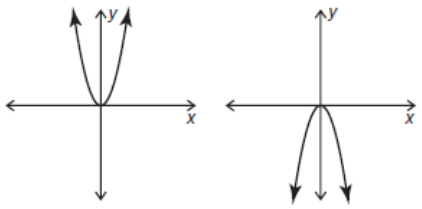
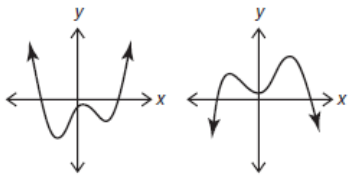
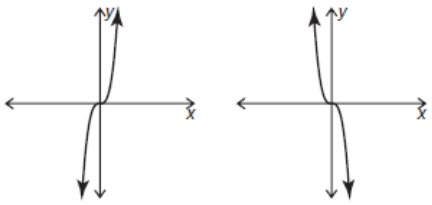
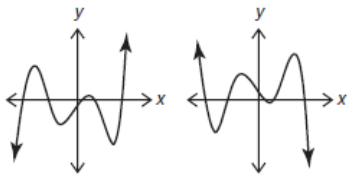
	$h_1(x) = x^6$	$h_2(x) = x^6 - 3x^2$	$h_3(x) = 2x^6 - 13x^5 + 26x^4 - 7x^3 - 2$
6th Degree Polynomials			
Number of Extrema	1	3	5

Take 5 mins to finish pg.374 in your book

5 a- N
b- A
c- S
d- A
e- S
f- N

PG.375 IN YOUR BOOK

6. Analyze the graphs shown.

Even Degree Power Functions	Even Degree Polynomial Functions
	
Odd Degree Power Functions	**Odd Degree Polynomial Functions**
	

a. State the similarities and differences you notice between the power functions and the polynomial functions.

b. What conclusions can you make about the end behavior of all even degree polynomial functions?

As $x \to \infty, f(x) \to \infty$ -OR- As $x \to \infty, f(x) \to -\infty$

As $x \to -\infty, f(x) \to \infty$ As $x \to -\infty, f(x) \to -\infty$

c. What conclusions can you make about the end behavior of all odd degree polynomial functions?

As $x \to \infty, f(x) \to \infty$ -OR- As $x \to \infty, f(x) \to -\infty$

As $x \to -\infty, f(x) \to -\infty$ As $x \to -\infty, f(x) \to \infty$

d. What conclusions can you make about the domain and range of all even degree polynomial functions?

D: $(-\infty, \infty)$ R: $(-\infty, \text{max}]$ or $[\text{min}, \infty)$ (absolute)

e. What conclusions can you make about the domain and range of all odd degree polynomial functions?

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

$5x^4 - x + 2$ $-2x^3 - 4x^2 + 7$

(7h) pg 376 Increasing: $(-\infty, -2.5)$ $(-1, 0.5)$ $(2.5, \infty)$

Decreasing: $(-2.5, -1)$ $(0.5, 2.5)$

(8h) I: $(-\infty, -2.5)$ $(-1.5, 0.5)$ $(2, 3)$

D: $(-2.5, -1.5)$ $(0.5, 2)$ $(3, \infty)$

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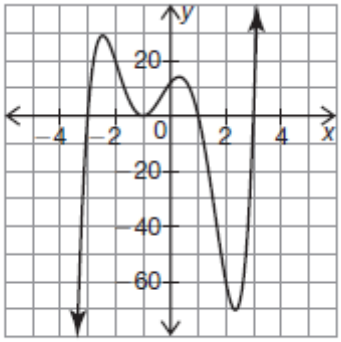
PG.376 IN YOUR BOOK

7. Consider the graph shown.



a. Is the *a*-value of this function positive or negative?

b. Is the degree of this function even or odd?

c. Can this function be a cubic function? Explain why or why not.

d. State the domain of this function.

e. State the range of this function.

f. Determine the number of relative extrema in this graph.

g. Determine the number of absolute extrema in this graph.

h. State the intervals where the graph is increasing.

*Complete #9 on pg.378 and fill in the table on pg.379

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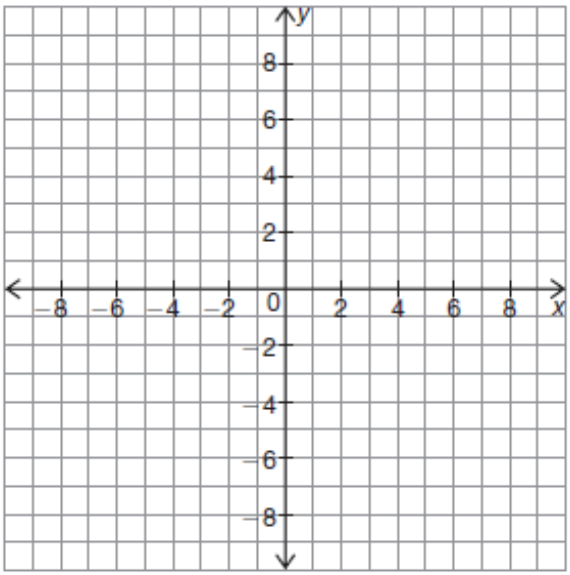
PG.380 IN YOUR BOOK

1. Use the coordinate plane to sketch a graph with the characteristics given. If the graph is not possible to sketch, explain why.

   a. Characteristics:

   - degree 4
   - starts in quadrant III
   - ends in quadrant IV
   - relative maximum at $x = -4$
   - absolute maximum at $x = 3$



finish pgs. 380-381 in your book with your group

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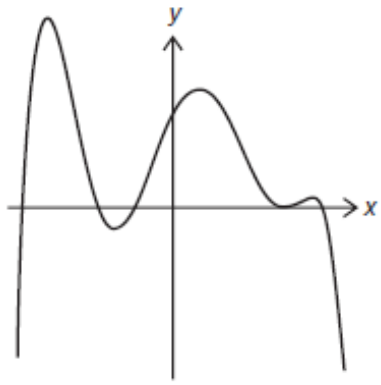
PG.382 IN YOUR BOOK

2. Analyze each graph. Circle the function(s) which could model the graph. Describe your reasoning to either eliminate or choose each function.

a.

$f_1(x) = -3x^5 - 2x^2 + 4x + 7$



$f_2(x) = -(x + 2)(x + 1.5)(x + 0.5)(x - 2.5)^2 (x - 3)$

$f_3(x) = -3x^4 - 2x^2 + 4x + 7$

Homework

Finish lesson 5.4

Aug 24-2:00 PM