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Class: Math 1301 Date: 4-17-13
Topic/Section:
Section 4.1, 4.2 Polynomial Functions

Examples and Vocabulary	Notes/Comments/Questions

Fundamental Properties of Polynomial Functions

① Formula can be written as

$y = f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + ax^2 + bx + c$

② n is called the degree

a_n is called the leading coefficient

$a_0 = c$ is called the constant coefficient

③ Number of x-int. is no more than the degree

④ Number of turning pts. is no more than $n-1$

⑤ y-int. = constant coeff.

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Examples and Vocabulary	Notes/Comments/Questions

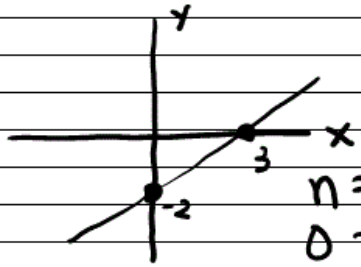
⑥ domain = all real numbers

⑦ the graph is a smooth, unbroken curve

① Which of the following functions are polynomials?

a. $f(x) = \frac{2}{3}x^1 - 2$ ✓

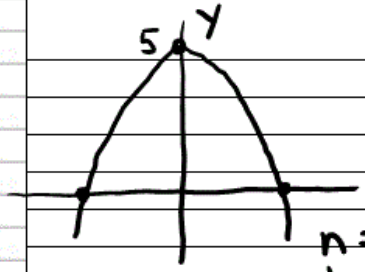
$n = 1$
$a_1 = 2/3$
$a_0 = -2$



n = 1
0 turning pt
1 x-int.

b. $f(x) = 5 - \frac{1}{2}x^2$ ✓

$n = 2$
$a_2 = -1/2$
$a_0 = 5$



n = 2
1 turning pt
2 x-int.

c. $f(x) = 4x - \frac{x^3}{3} + 2 = 4x - \frac{1}{3}x^3 + 2$ ✓

$n = 3$
$a_3 = -1/3$
$a_0 = 2$

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Examples and Vocabulary	Notes/Comments/Questions
d. $f(x) = x^4 - 3x^3 + 2x + 0$ $n = 4$ $a_4 = 1$ $a_0 = 0$	
e. $f(x) = x^5 + \frac{5}{2}x^4 - \frac{5}{2}x^3 - 5x^2 - 1$ $n = 5$ $a_5 = 1$ $a_0 = -1$	
f. $f(x) = 2x - \frac{1}{x^2} = 2x - x^{-2}$ X	
g. $f(x) = \frac{2\sqrt{x} - x^3}{x}$	
h. $f(x) = \sqrt{2}$ $n = 0$ $a_0 = \sqrt{2}$	i. $g(x) = 0$

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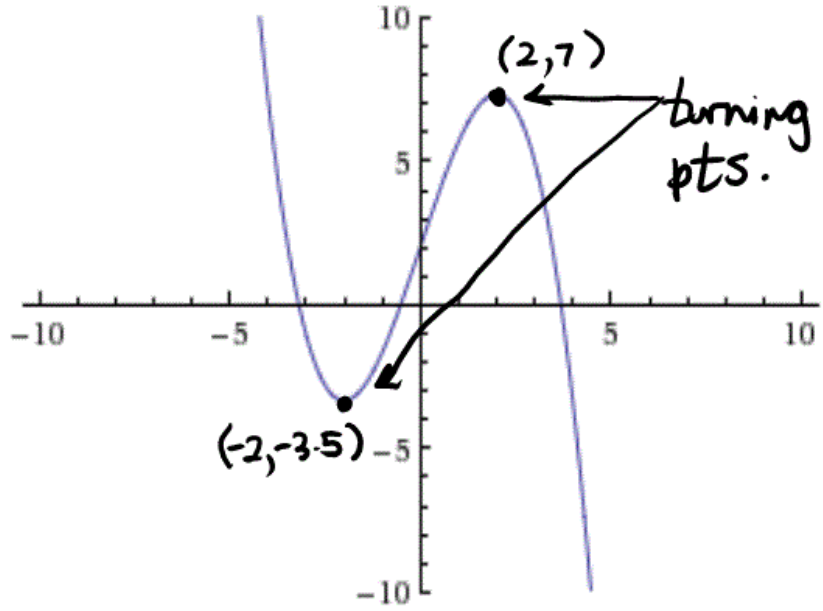
Examples and Vocabulary	Notes/Comments/Questions
$f(x) = 4x - \frac{x^3}{3} + 2$	$n = 3$ 2 turning pts 3 x-int.



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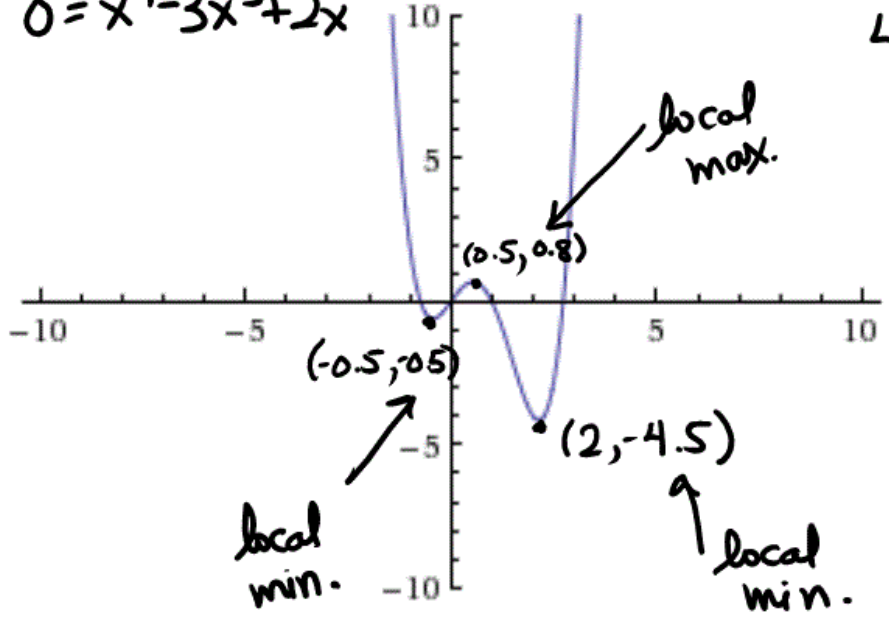
Examples and Vocabulary	Notes/Comments/Questions
$f(x) = x^4 - 3x^3 + 2x$	$n = 4$
$0 = x^4 - 3x^3 + 2x$	3 turning pts
	4 x-int.



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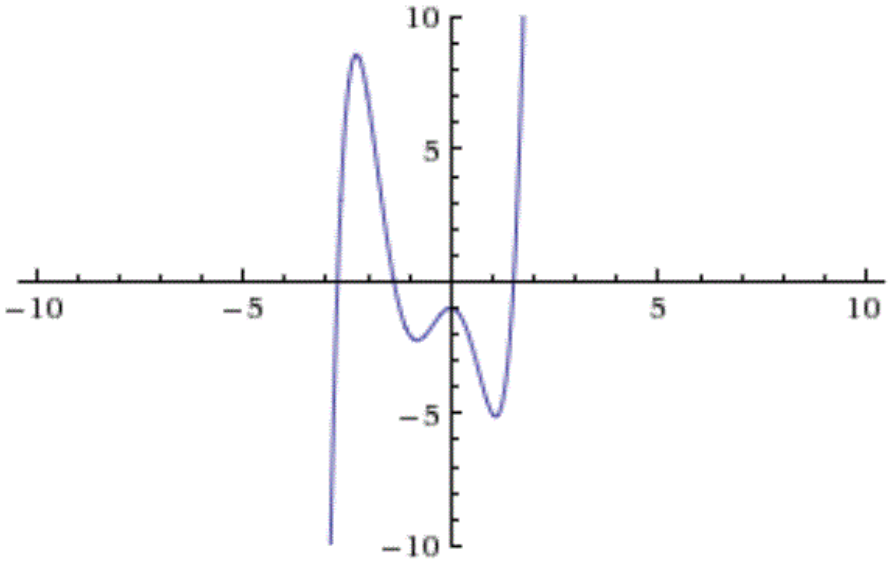
Examples and Vocabulary	Notes/Comments/Questions
$f(x) = x^5 + \frac{5}{2}x^4 - \frac{5}{2}x^3 - 5x^2 - 1$	$n = 5$
	4 turning pts. 3 x-int.

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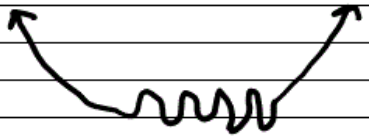
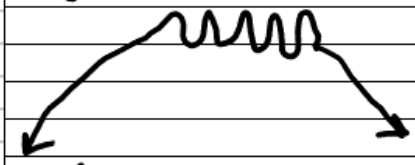
Examples and Vocabulary	Notes/Comments/Questions

End Behavior of Polynomial Functions

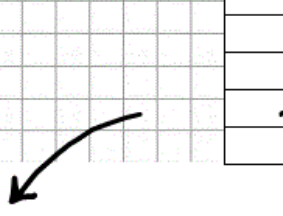
a. If n is even and $a_n > 0$, then the graph rises on the "far" left and "far" right.



b. If n is even and $a_n < 0$, then the graph falls on the "far" left and "far" right.



c. If n is odd and $a_n > 0$, then the graph falls on the "far" left and rises on the "far" right.



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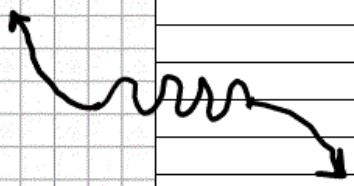
Examples and Vocabulary	Notes/Comments/Questions

d. If n is odd and $a_n < 0$, then the graph rises on the "far" left and falls on the "far" right.



② For the function graphed here:

a. Could this be the graph of a polynomial? Yes

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Examples and Vocabulary	Notes/Comments/Questions
b. Is the degree n odd or even? Odd	
c. Is the leading coeff. positive or negative? $a_n < 0$	
d. What is the minimum possible degree? 3	