

Notes 9/7/17 2B.3 End Behavior + Graphs of Polynomial Functions

END BEHAVIOR

of a polynomial function is the behavior of the graph of $f(x)$ as x approaches positive infinity or negative infinity

End Behavior of a polynomial function is determined by the DEGREE and LEAD COEFFICIENT

$$f(x) = ax^n + bx^{n-1} + \dots$$

↑
Leading Coefficient
↑
degree
(highest exponent)

End Behavior of graph

if n is even	if n is odd
↗ for $a > 0$ ↘ for $a < 0$	↗ for $a > 0$ ↘ for $a < 0$

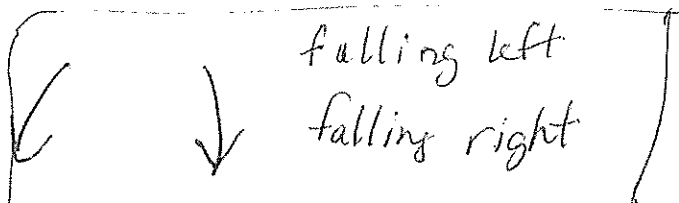
EX1 Describe the end behavior of the graphs of each function.

a.) $f(x) = -2x^4 + 7x^3 - 14x - 9$

n degree: 4 (even)

$a = -2$ ($a < 0$)

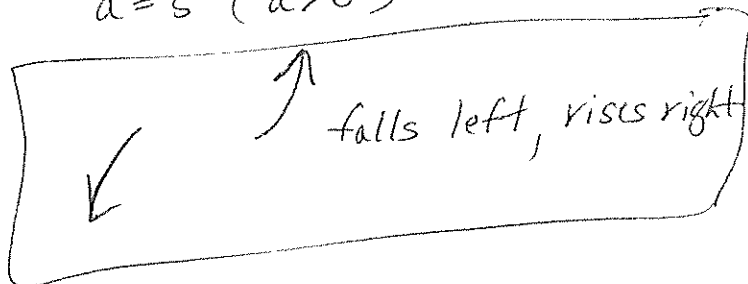
So, the ends of the graphs are



b.) $g(x) = 5x^5 + 4x^4 - 3x^3 + 2x^2 + 1$

n degree: 5 (odd)

$a = 5$ ($a > 0$)



ZEROS OF POLYNOMIAL FUNCTIONS

ZEROS { x-intercepts
solutions
roots } all mean the same thing

EX2 sketch the graph of

$$f(x) = x^3 - 2x^2$$

1st End Behavior

degree: 3 (odd)

$a = 1$ ($a > 0$)

2nd Find zeros

$$x^3 - 2x^2 = 0$$

$$x^2(x-2) = 0$$

$$x^2 = 0 \quad x-2 = 0$$

$$x = 2$$

multiplicity of 2

Zeros: $\{0, 0, 2\}$ (3rd degree so there are 3 zeros)

3rd Additional Points

x	$y = x^3 - 2x^2$	
-1	$(-1)^3 - 2(-1)^2 = -3$	$(-1, -3)$
1	$1^3 - 2(1)^2 = -1$	$(1, -1)$
3	$3^3 - 2(3)^2 = 9$	$(3, 9)$

choose points on either sides of zeros.

4th Graph using:

- ① End behavior
- ② Zeros
- ③ additional points

