Day 2 - Polynomial Functions

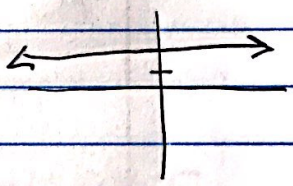
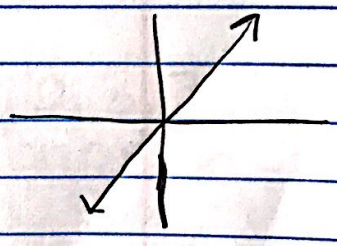
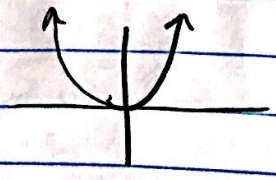
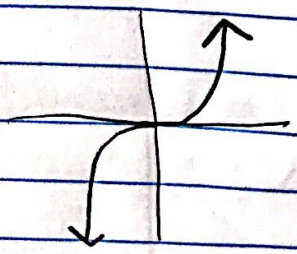
I A polynomial is an expression of 4 or more algebraic terms

* The degree is the highest ordered exponent

Ex: $f(x)\ 5x^3 - 6x^2 + 7x - 4$

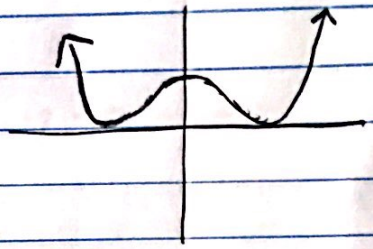
this is a 3rd degree polynomial

II Classifying Polynomial Functions

Name	Example	Degree	Graph
① Constant	$y = 2$ $y =$ constant	0	
② Linear	$y = x$ $y = mx + b$	1	
③ Quadratic	$y = x^2$ $y = ax^2 + bx + c$	2	
④ Cubic	$y = x^3$ $y = ax^3 + bx^2 + cx + d$	3	

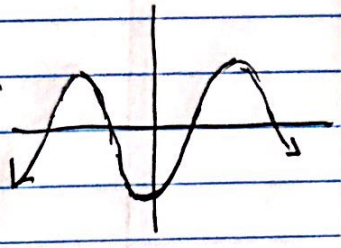
⑤ Quartic $y = x^4$ 4

$y = ax^4 + bx^3 + cx^2 + dx + e$



⑥ Quintic $y = x^5$ 5

$y = ax^5 + bx^4 + cx^3 + dx^2 + ex + f$

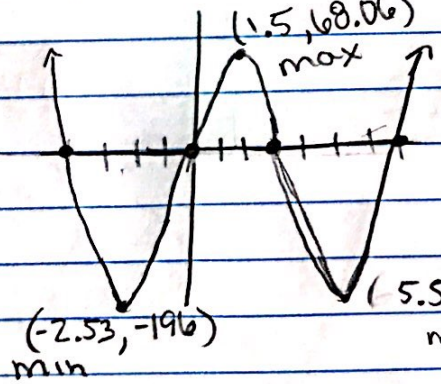


* Past these, called n^{th} degree polynomials

III Fundemental Thm of Algebra

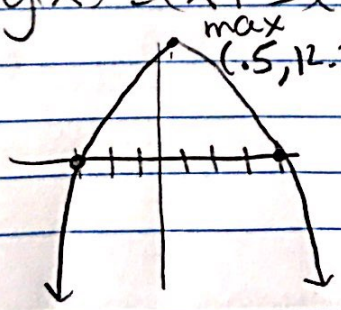
A polynomial of degree n has at most n solutions.

Ex ① $f(x) = x(x-3)(x+4)(x-7)$ * must adjust window



- Quartic
- Zeros: $-4, 0, 3, 7$
- extrema: on graph
- increasing: $(-2.53, 1.5) \cup (5.53, \infty)$
- decreasing: $(-\infty, -2.53) \cup (1.5, 5.53)$
- domain: $(-\infty, \infty)$
- Range: $[-196, \infty)$

② $g(x) = (x+3)(4-x)$

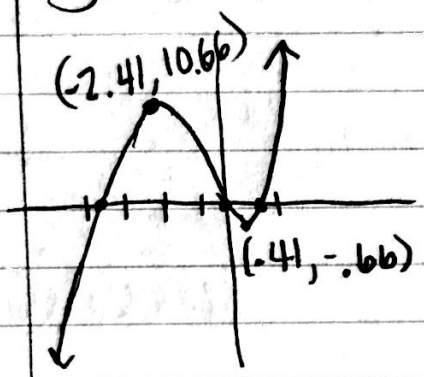


- Quadratic
- Zero's: $-3, 4$
- extrema: on graph
- increasing: $(-\infty, .5)$
- decreasing: $(.5, \infty)$

domain $(-\infty, \infty)$

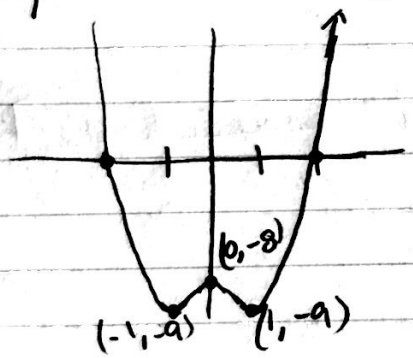
Range: $(-\infty, 12.25]$

③ $g(x) = x^3 + 3x^2 - 3x$



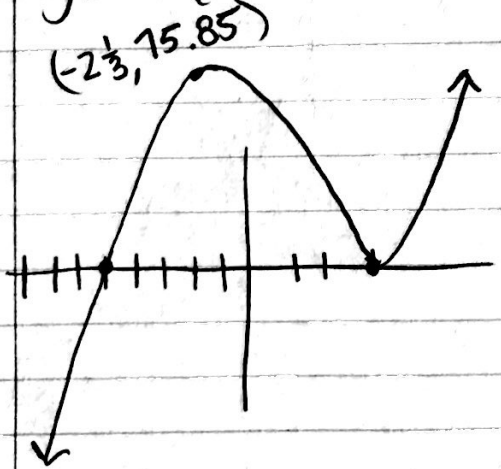
- Cubic
- zeros: -3.79, 0, .79
- extrema: on graph
- ↑ : $(-\infty, -2.41) \cup (.41, \infty)$
- ↓ : $(-2.41, .41)$
- D : $(-\infty, \infty)$
- R : $(-\infty, \infty)$

④ $y = x^4 - 2x^2 - 8$



- Quartic
- zeros: -2, 2
- extrema: on graph
- ↑ $(-1, 0) \cup (1, \infty)$
- ↓ $(-\infty, -1) \cup (0, 1)$
- D: $(-\infty, \infty)$
- R: $(-9, \infty)$

⑤ $g(x) = (x-3)^2(x+5)$



- Cubic
- zeros: -5, 3 (mult of 2)
- extrema: on graph
- ↑ $(-\infty, -2\frac{1}{3}) \cup (3, \infty)$
- ↓ : $(-2\frac{1}{3}, 3)$
- D : $(-\infty, \infty)$
- R : $(-\infty, \infty)$