SOLNS = ROOTS = X-INT. = ZEROS

EXTREMA + 1 = DEGREE

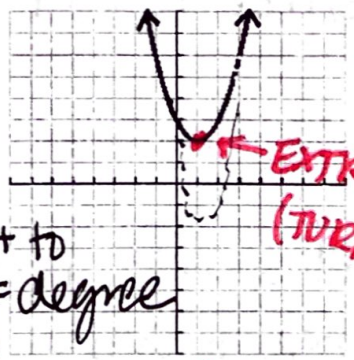
Honors Math III

9.2: Graphs of Polynomial Functions

EVEN DEGREE → SAME END BEHAVIORS

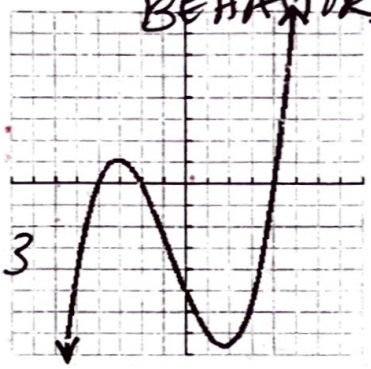
ODD DEGREE → OPPOSITE END BEHAVIORS

1. quadratic
# of extrema: 1
Min Degree: 2
Positive Zeros: 0
Negative Zeros: 0
Imaginary Zeros: 2
(always even)



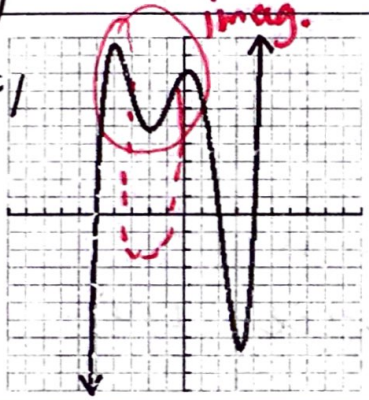
+ to = degree

2. cubic
# of extrema: 2
Min Degree: 3
Positive Zeros: 1
Negative Zeros: 2
Imaginary Zeros: 0
= 3

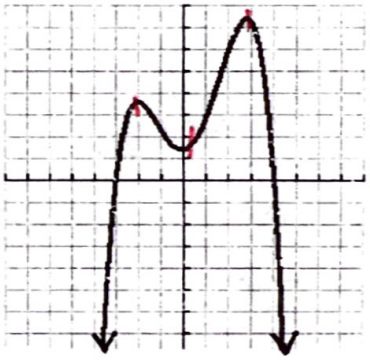


3.
# of extrema: 4
Min Degree: 5
Positive Zeros: 2
Negative Zeros: 1
Imaginary Zeros: 2

+1

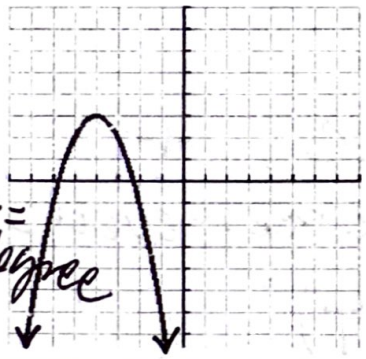


4.
# of extrema: 3
Min Degree: 4
Positive Zeros: 1
Negative Zeros: 1
Imaginary Zeros: 2

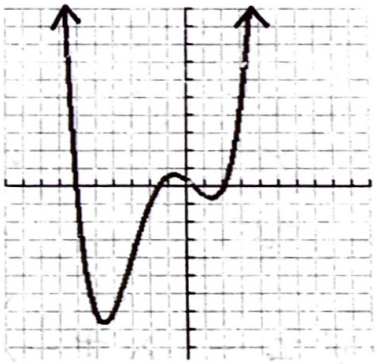


5. quadratic
# of extrema: 1
Min Degree: 2
Positive Zeros: 0
Negative Zeros: 2
Imaginary Zeros: 0

+= degree

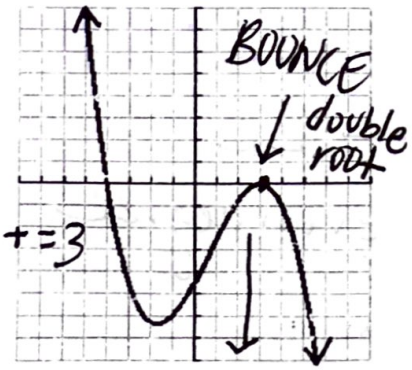


6.
# of extrema: 3
Min Degree: 4
Positive Zeros: 2
Negative Zeros: 2
Imaginary Zeros: 0



7. cubic
# of extrema: 2
Min Degree: 3
Positive Zeros: 2
Negative Zeros: 1
Imaginary Zeros: 0

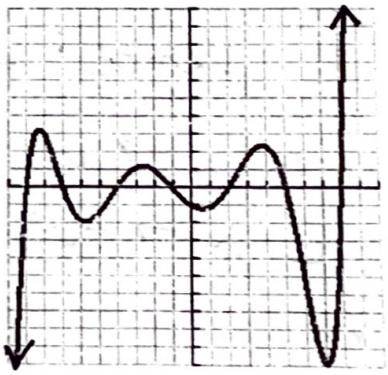
+=3



$x = 3$

$(x-3)^2$

8.
# of extrema: 6
Min Degree: 7
Positive Zeros: 3
Negative Zeros: 4
Imaginary Zeros: 0



+ LC → RIGHT SIDE UP

For each of the following, state the *# of **extrema*** and the ***right*** and ***left end behaviors***.

9) $f(x) = -2x^4 + 3x^7 - 5$ DEGREE = 7 → ODD

# of extrema 6 ENDS OPPOSITE

R x→ ∞, y→ ∞ Why? leading coefficient is +

L x→ $-\infty$, y→ $-\infty$ Why? degree is odd

10) $f(x) = 3x^5 - x^8 - 1$ DEG = 8 ⇒ EVEN

# of extrema 7 − LC

R x→ ∞, y→ $-\infty$ Why? leading coeff. is −

L x→ $-\infty$, y→ $-\infty$ Why? degree is even

11) $f(x) = -5x^3 + 2x^2 + 9$

# of extrema 2

x→ ∞, y→ $-\infty$ Why? LC is −

x→ $-\infty$, y→ ∞ Why? degree is odd

12) $f(x) = x^4 + x^2 + 2$

# of extrema 3

x→ ∞, y→ ∞ Why? LC is +

x→ $-\infty$, y→ ∞ Why? degree is even

13) $y = -(x+2)^2(x-3)^1(x+4)^3$

Degree: $2+1+3=6$

R $x \to \infty$ $y \to -\infty$ − LC

L $x \to -\infty$ $y \to -\infty$ even degree

① Sketch the graph.

$y = (x+2)(x^2-4)$

$= (x+2)(x+2)(x-2)$

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

$x+2=0$ | $x-2=0$

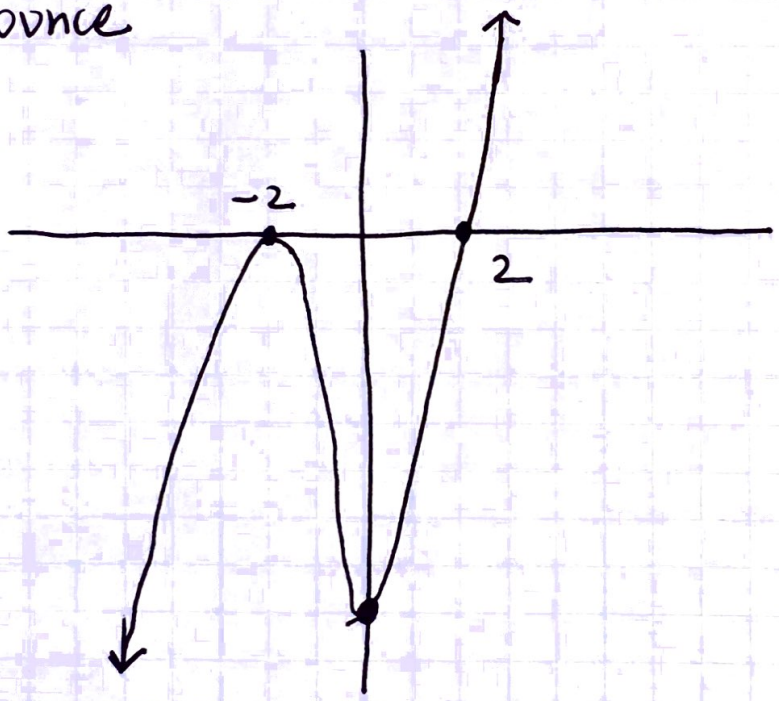
$x=-2$ | $x=2$

double root → bounce

Degree: 3 → left down

+LC → right up

$(0, -8)$ y-int.



$-8 - {}^{-2}$

$a = x-2$

② $(x-2)^3 - (x-2) = y$

$a^3 - a = y$

$a(a^2-1) = a(a+1)(a-1)$

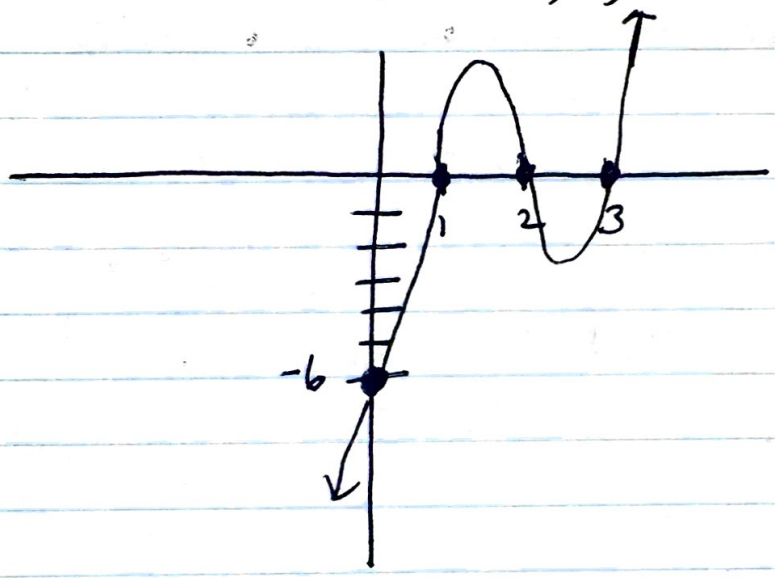
$x-2+1 \quad x-2-1$

$(x-2)(x-1)(x-3) = y$

roots: $x = 2, 1, 3$

degree = 3

+ LC

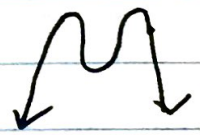


(0, -6)

③ $y = -(x+2)^3 (x-3)^1$

Degree: $3+1 = 4$

− LC → right down



roots: $x = -2, 3$

triple root