Algebra 2--H | Chapter 6 | UPPER AND LOWER BOUNDS
GRAPHING POLYNOMIAL FUNCTIONS
END BEHAVIOR OF FUNCTIONS

UPPER AND LOWER BOUNDS

A *positive* integer, a, is the ***upper bound*** of the real zeros of a polynomial function $f(x)$ if $f(x) \div (x-a)$ results in a polynomial function with *nonnegative* coefficients and remainder.

A *negative* integer, b, is the ***lower bound*** of the real zeros of a polynomial function $f(x)$ if $f(x) \div (x-b)$ results in a polynomial function that has coefficients and remainder with alternating signs.

***Note: A coefficient of 0 may be positive or negative as needed to fit the pattern for upper or lower bound.*

LOWER BOUND $\leq$ REAL ZEROS $\leq$ UPPER BOUND

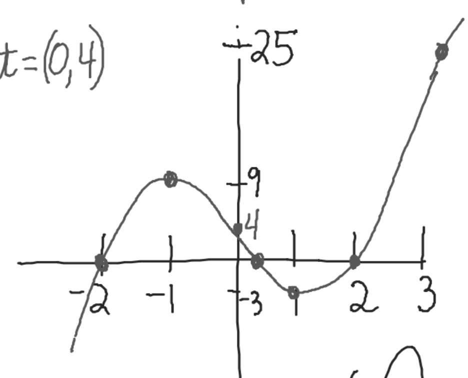
Ex 1: $f(x) = 2x^3 - x^2 - 8x + 4$

	x	2	−1	−8	4
	1	2	1	−7	−3
zero	2	2	3	−2	0 ☺
upper bound	3	2	5	7	25
	−1	2	−3	−5	9
lower bound	−2	2	−5	2	⊖

y

$-2 \leq$ real zeros ≤ 3

yint = (0,4)



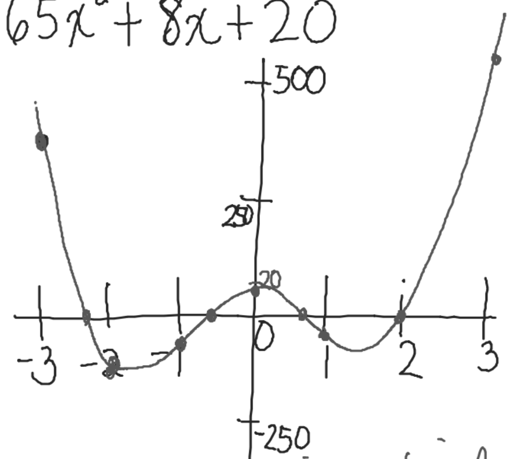
$\frac{p}{q} = \frac{\pm(1,2,4)}{\pm(1,2)} = \pm\left(1, \frac{1}{2}, 2, 4\right)$

possible rational zero $= \frac{1}{2}$

$$f(x) = 12x^4 + 4x^3 - 65x^2 + 8x + 20$$

	x	12	4	-65	8	20
	1	12	16	-49	-41	-21
zero	2	12	28	-9	-10	0 :)
u.b.	3	12	40	55	173	539
	-1	12	-8	-57	65	-45
	-2	12	-20	-25	58	-96
LB	-3	12	-32	31	-85	275

(0, 20)



$-3 \le$ real zeros ≤ 3

possible rational zeros

$$\frac{p}{q} = \frac{\pm(1, 2, 4, 5, 10, 20)}{\pm(1, 2, 3, 4, 6, 12)}$$

$-\frac{5}{2}$

$\pm\left(\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}, \frac{1}{12}, \frac{2}{3}, \frac{5}{6}, \frac{5}{12}\right)$

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