



"Rational Root Test" (R.R.T.)
"Rational Zero Theorem"

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- * R.R.T. will NOT Explicitly give the zeros of a Polynomial.
- * R.R.T. is only a practical way to point to "possible starting guesses" for the zeros to be used in the testing process.
- * one you get a list try each element in $f(x)$ to see if we get "0".

EX#1: $f(x) = 12x^2 - 7x - 10 \leftarrow$ Apply R.R.T.

Factors of "12" } 1, 2, 3, 4, 6, 12

Factors of "10" } 1, 2, 5, 10

Ma Bante Force

Possible Zeros are $\Rightarrow \frac{\pm(1, 2, 5, 10)}{(1, 2, 3, 4, 6, 12)} =$

long list 😞

EX#2: $f(x) = x^2 - 2 \leftarrow$ Apply R.R.T.

Factors of "2" } $\rightarrow 1, 2$

Possible Zeros $\Rightarrow \frac{\pm(1, 2)}{1} = \pm 1, \pm 2$ *Answers*

2

Apply R.R.T.

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EX#3:

$$f(x) = 1x^4 + 2x^3 - 7x^2 - 8x + 12$$

Take this

Factor of
"12"

1, 2, 3, 4, 6, 12

Possible zeros are $\Rightarrow \pm (1, 2, 3, 4, 6, 12)$

Answer
 $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

Possible Zeros

EX#4:

Apply R.R.T.

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

Take 2

Factor of
"5"

1, 5

Possible Zeros are $\Rightarrow \pm \frac{(1, 5)}{(1, 2)}$

$\pm \frac{1}{(1, 2)}$ $\pm \frac{5}{(1, 2)}$

Answer

$\pm 1; \pm \frac{1}{2}; \pm 5; \pm \frac{5}{2}$

$\pm \frac{1}{2}; \pm 1; \pm \frac{5}{2}; \pm 5$

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Apply R.R.T.

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EX#5: $f(x) = 6x^4 - 11x^3 + 8x^2 - 33x - 30$

Factor: 1, 2, 3, 6

Factor: 1, 2, 3, 5, 6, 10, 15, 30

+ (1, 2, 3, 5, 6, 10, 15, 30)

(1, 2, 3, 6)

$= \pm \frac{1}{(1, 2, 3, 6)} \rightarrow \pm 1, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{1}{6}$

$\pm \frac{2}{(1, 2, 3, 6)} \rightarrow \pm 2, \pm 1, \pm \frac{2}{3}, \pm \frac{1}{3}$

$\pm \frac{3}{(1, 2, 3, 6)} \rightarrow \pm 3, \pm \frac{3}{2}, \pm 1, \pm \frac{1}{2}$

$\pm \frac{5}{(1, 2, 3, 6)} \rightarrow \pm 5, \pm \frac{5}{2}, \pm \frac{5}{3}, \pm \frac{5}{6}$

$\pm \frac{6}{(1, 2, 3, 6)} \rightarrow \pm 6, \pm 3, \pm 2, \pm 1$

$\pm \frac{10}{(1, 2, 3, 6)} \rightarrow \pm 10, \pm 5, \pm \frac{10}{3}, \pm \frac{5}{3}$

$\pm \frac{15}{(1, 2, 3, 6)} \rightarrow \pm 15, \pm \frac{15}{2}, \pm 5, \pm \frac{5}{2}$

$$\pm \frac{30}{(1, 2, 3, 6)} \rightarrow (\pm 30), (\pm 15), (\pm 10), (\pm 5)$$

$\pm 1 ; \pm 2 ; \pm 3 ; \pm 5 ; \pm 6 ; \pm 10 ; \pm 15 ; \pm 30$

$$\pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{1}{6}, \pm \frac{2}{3}, \pm \frac{3}{2}, \pm \frac{5}{2}, \pm \frac{5}{3}, \pm \frac{5}{6}$$

$$\pm \frac{15}{2}, \pm \frac{10}{3}$$

Answer.

Ans: $\pm \left\{ 1, 2, 3, 5, 6, 10, 15, 30 \right.$
 $\left. \frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \frac{15}{2}, \frac{1}{3}, \frac{2}{3}, \frac{5}{3}, \frac{10}{3}, \frac{1}{6}, \frac{5}{6} \right\}$

Possible Zeros

EX #6: Apply R.R.T. to

$$f(x) = 1x^4 - x^3 - 9x^2 - 3x - 36$$

Factor: 1

Factor: 1, 2, 3, 4, 5, 9, 12, 18
36

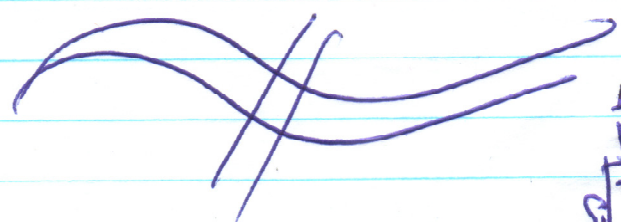
$$\pm (1, 2, 3, 4, 6, 9, 12, 18, 36)$$

1

$\pm (1, 2, 3, 4, 6, 9, 12, 18, 36)$

Answer

Possible Zeros



The end.

