

roots zeros solutions

Synthetic division - Remainder 0!

Quadratic: factor, quadratic formula

* Descartes rule of signs

* Rational Zero Theorem

Descartes Rule of Signs · Rational Zero Theorem

Notes

A/3/2009

Objective: To 1) determine the number and type of roots for a polynomial equation, 2) determine possible rational roots for a polynomial equation, and 3) find the zeros (roots) of a polynomial equation.

Ex 1: Determine the number and type of roots.

$f(x) = x^3 - 4x^2 + 6x - 4$

+ - + -
 1 1 1 1

"or less than this by an even number"

+	-		i
3	0	0	*
1	0	2	*

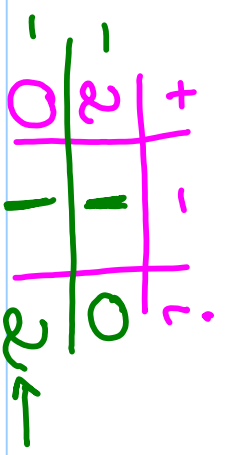
$f(x) = x^3 - 4x^2 - 4$

- - - -
 1 1 1 1

subtract!
2

3 roots

Ex2: $f(x) = x^3 - x^2 + 2x + 4$



$$f(-x) = -x^3 - x^2 - 2x + 4$$

imaginary #'s
Come in Pairs

EX3:

$$f(x) = x^5 - 6x^4 - 3x^3 + 7x^2 - 8x + 1$$

$$f(-x) = -x^5 - 6x^4 + 3x^3 + 7x^2 + 8x + 1$$

[Redacted]

+	-	-	-	-	+
1	1	2	1	1	1

(1)

5 roots

What if ...

$$\begin{array}{r|l} + & - \\ \hline 3 & 2 \end{array} \quad \begin{array}{r|l} & i \\ \hline & \end{array}$$

Ex 4:

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

Rational
Zero Theorem

$$p = 12 : \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$$

$$q = 1 : \pm 1$$

$$p = \dots = \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$$

q

$$f(x) = \dots$$

+	-	+
3	0	0
1	0	2

$$f(x) = 3x^4 - x^3 + 4 \quad f(-x) = 3x^4 + x^3 + 4$$

4 roots

+	-	+
2	0	2
0	0	4

$$p = 4 : \pm 1, \pm 2, \pm 4$$

$$q = 3 : \pm 1, \pm 3$$

$$p = \pm 1, \pm \frac{1}{3}, \pm 2, \pm \frac{2}{3}, \pm 4, \pm \frac{4}{3}$$

you findy ...

$$f(x) = x^4 + x^3 - 19x^2 + 11x + 30$$

P 376 (19-24) all $\frac{+|-}{-|+}$

P 381 (13-17) odd $\frac{P}{f}$

P 381 (7, 24) everything

