Polynomial:

$$\left.\begin{array}{c} P(x) \\ \text{or} \\ P_n(x) \end{array}\right\} = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x^1 + a_0$$

a_n, a_{n-1} etc: coefficients (numbers)

$n, n-1$, etc: non-negative integers

\# solutions
- real
- complex (with i)

← n: degree

$a_n x^n$: leading term

→ end behavior

Example of b. h. polynomial.
(big, hairy)

$$P(x) = -15x^6 - 54x^5 + 10x^4 - 3x^3 + x^2 - 52x + 3$$

degree: 6   6 solutions

end behavior: down-down
n even
a_n negative

Polynomial Equation:

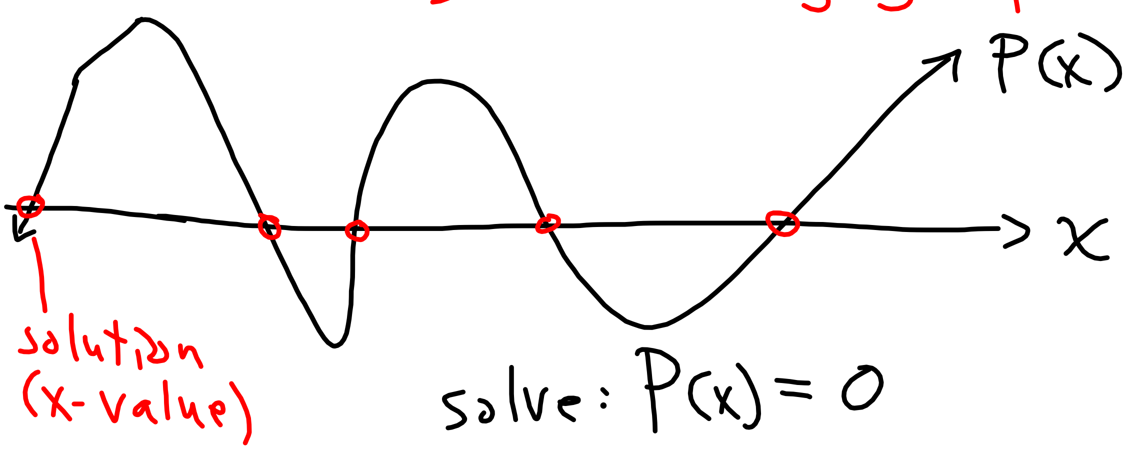
Standard: $P(x) = 0$

Other: $P(x) = Q(x)$

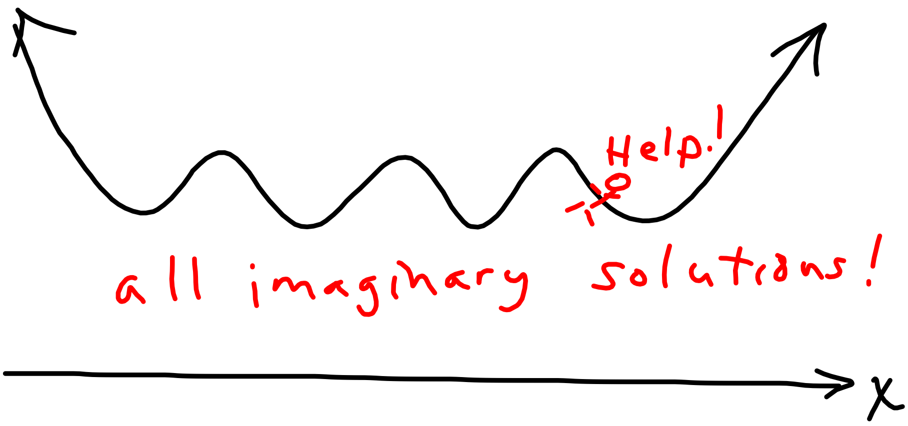
$P(x)$: one polynomial
$Q(x)$: some other polynomial

standard: finding <u>real</u>* solutions by graphing

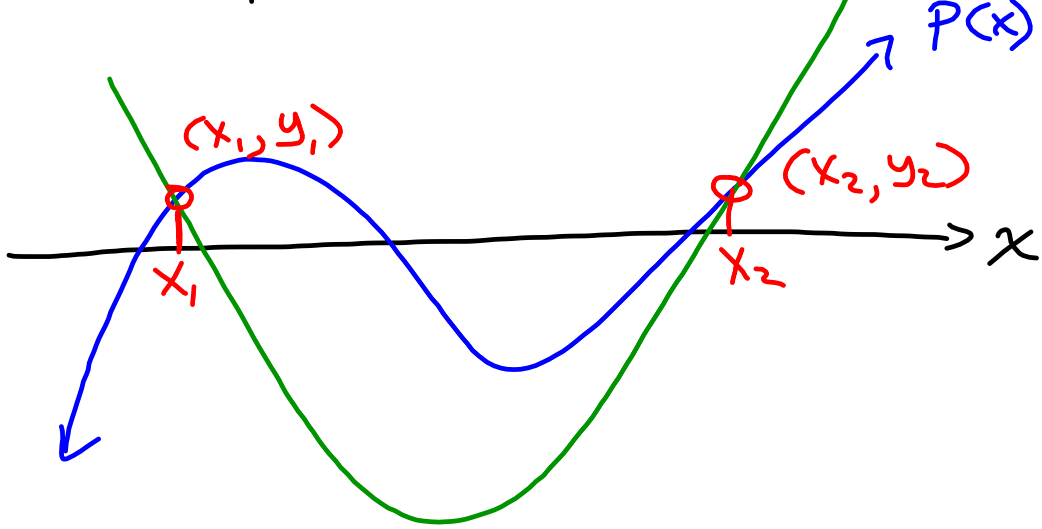
* you <u>cannot</u> find the complex (aka imaginary) solutions by graphing.



solve: $P(x) = 0$



$P(x) = Q(x)$

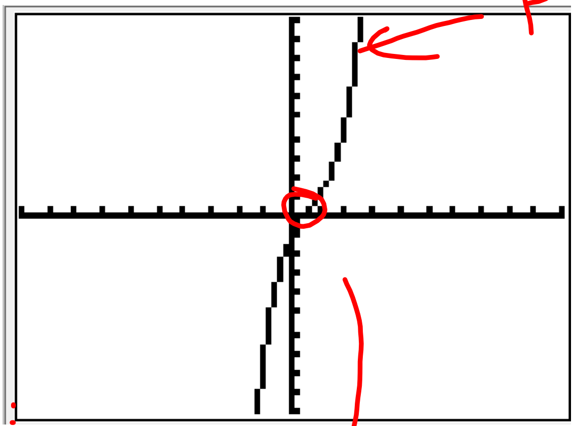


solve: $P(x) = Q(x)$

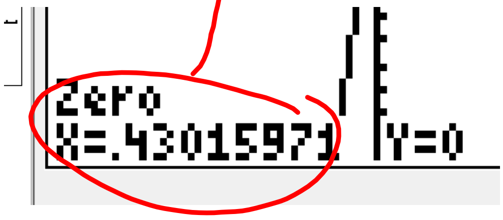
solution: $x = x_1 \quad x = x_2$

Ex: $P(x) = x^3 - 2x^2 + 3x - 1$

P(x)



Solution:
$x = 0.43$
(2 imaginary)



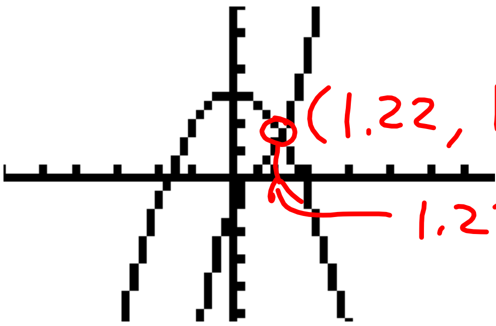
$P(x) = Q(x)$

$Q(x) = 3 - x^2$

$(P(x) = x^3 - 2x^2 + 3x - 1)$

(1.22, 1.51)

1.22



solution:
$x = 1.22$
(2 imaginary)

$$P(x) = x^3 - 2x^2 + 3x - 1$$

$$Q(x) = 3 - x^2$$

$$P(x) = Q(x)$$

$$x^3 - 2x^2 + 3x - 1 = 3 - x^2$$

$$+x^2 \qquad -3 \qquad -3 + x^2$$

$$x^3 - x^2 + 3x - 4 = 0$$