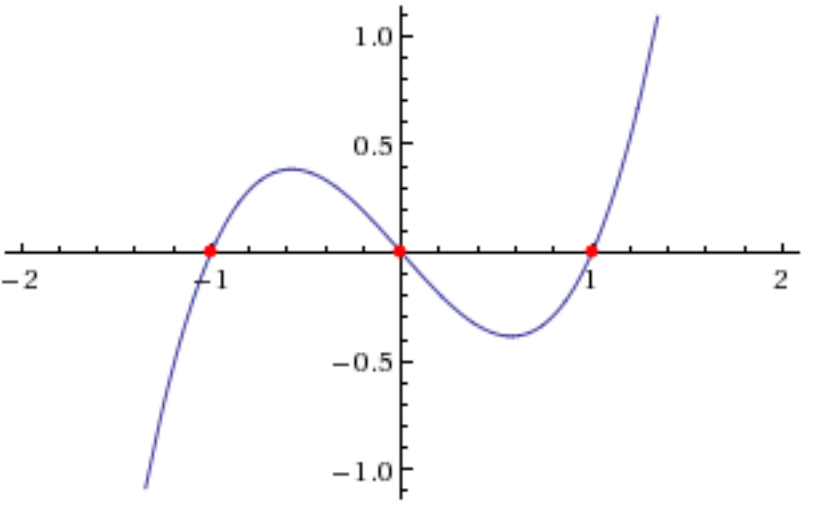
1 0 -1 0

Input:

$$x^3 - x = 0$$

Root plot:



Alternate forms:

$$x^3 = x$$

$$(x-1)\,x\,(x+1) = 0$$

Solutions:

$$x = -1$$

$$x = 0$$

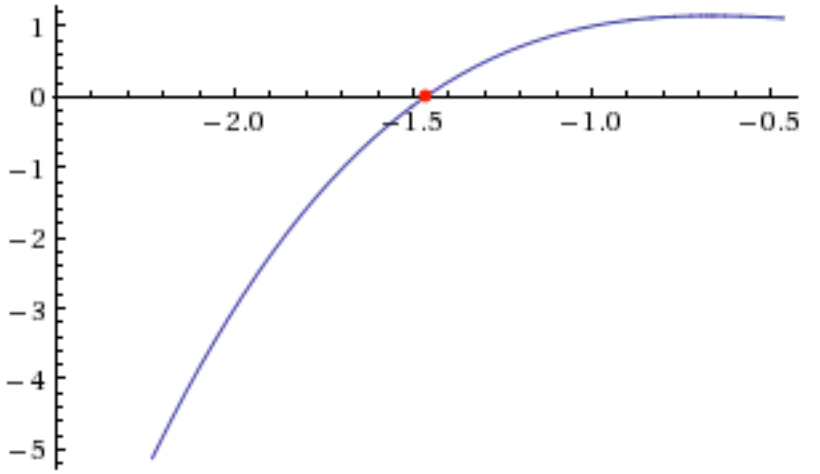
$$x = 1$$

1101

Input:

$$x^3 + x^2 + 1 = 0$$

Root plot:



Alternate form:

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

Real solution:

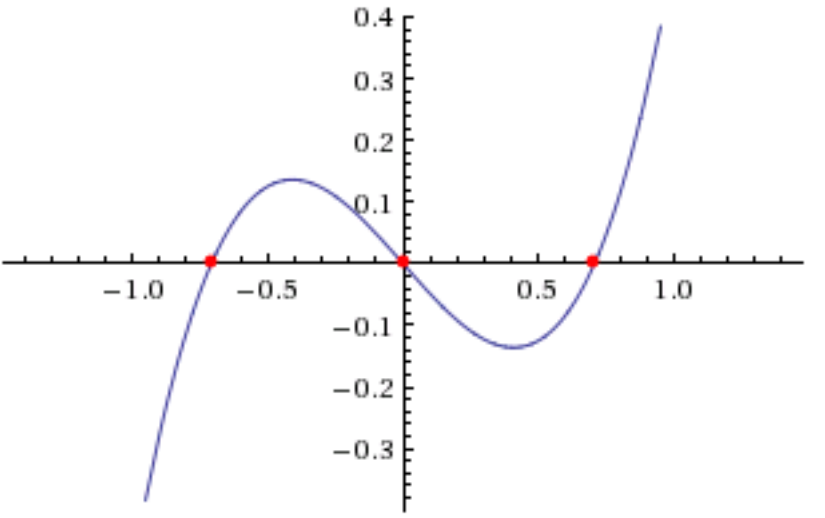
$$x = -1.4656$$

1 0 -0.5 0

Input:

$$x^3 - 0.5\,x = 0$$

Root plot:



Alternate form:

$$(x - 0.707107)\,x\,(x + 0.707107) = 0$$

Alternate form assuming x is real:

$$x^3 - 0.5\,x + 0.\,i = 0$$

Solutions:

$$x = -0.707107$$

$$x = 0$$

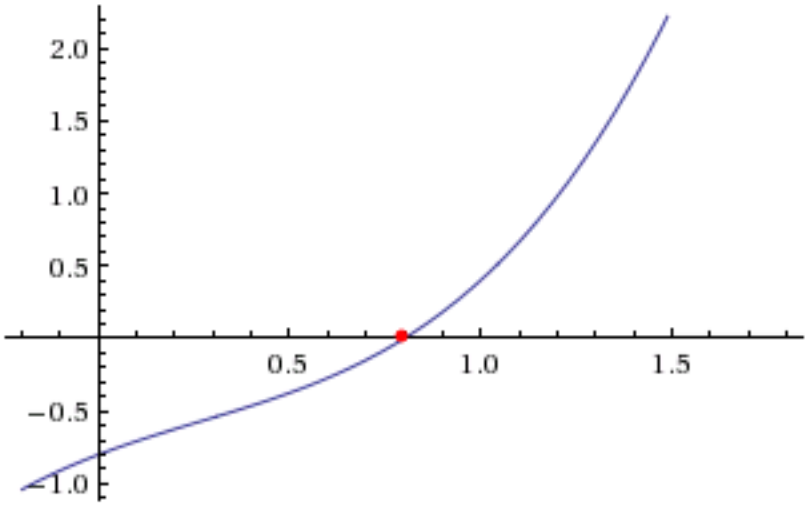
$$x = 0.707107$$

1 -0.8 1 -0.8

Input:

$$x^3 - 0.8\,x^2 + x - 0.8 = 0$$

Root plot:



Alternate forms:

$$(x - 0.266667)^3 + 0.786667\,(x - 0.266667) - 0.5712$$

$$(x - 0.8)\left(x^2 + 1.\right) = 0$$

Alternate form assuming x is real:

$$-(0.8 + 0.\,i) + x^3 - 0.8\,x^2 + x = 0$$

Real solution:

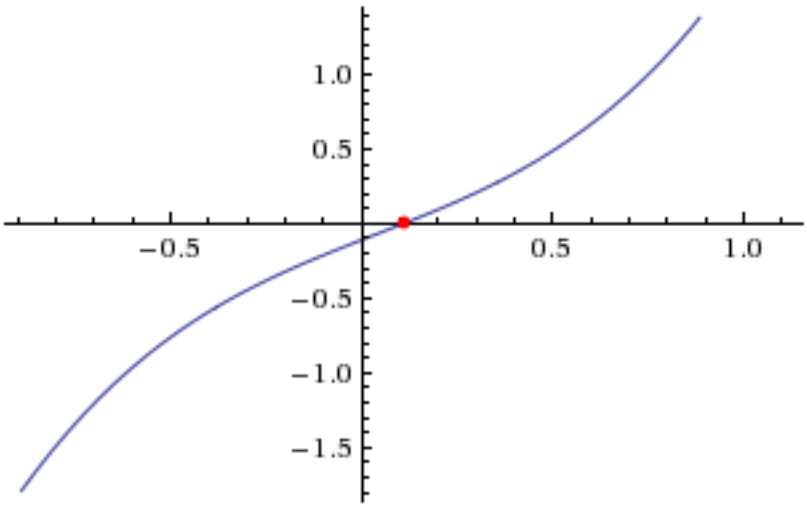
$$x = 0.8$$

1 -0.11 1 -0.11

Input:

$$x^3 - 0.11\,x^2 + x - 0.11 = 0$$

Root plot:



Alternate forms:

$$(x - 0.0366667)^3 + 0.995967\,(x - 0.0366667) - 0.073$$

$$(x - 0.11)\left(x^2 + 1.\right) = 0$$

Alternate form assuming x is real:

$$-(0.11 + 0.\,i) + x^3 - 0.11\,x^2 + x = 0$$

Real solution:

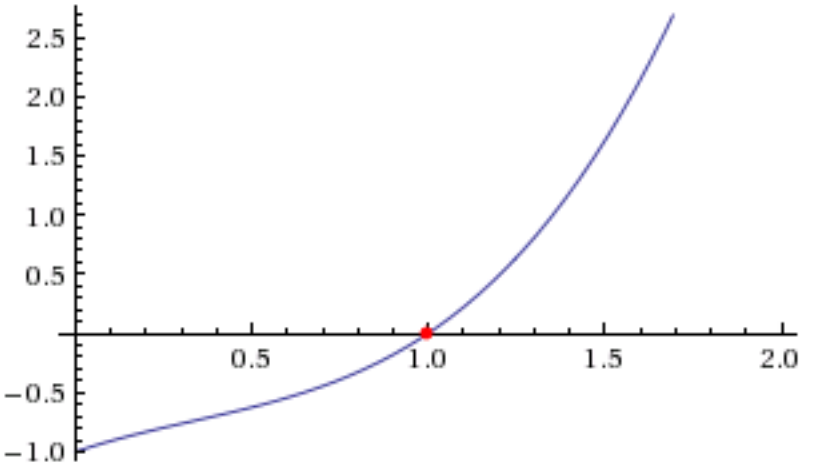
$$x = 0.11$$

1 -1 1 -1

Input:

$$x^3 - x^2 + x - 1 = 0$$

Root plot:



Alternate forms:

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

$$(x - 1)\left(x^2 + 1\right) = 0$$

$$\left(x - \frac{1}{3}\right)^3 + \frac{2}{3}\left(x - \frac{1}{3}\right) - \frac{20}{27} = 0$$

Real solution:

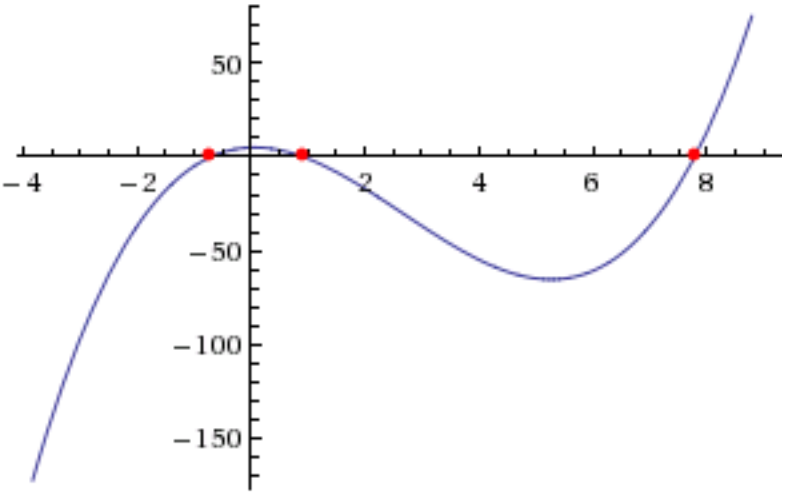
$$x = 1$$

1 -8 1 5

Input:

$$x^3 - 8x^2 + x + 5 = 0$$

Root plot:



Alternate forms:

$$x^3 + x + 5 = 8x^2$$

$$x^3 - 8x^2 + x = -5$$

$$\left(x - \frac{8}{3}\right)^3 - \frac{61}{3}\left(x - \frac{8}{3}\right) - \frac{817}{27} = 0$$

Solutions:

$$x = -0.70270$$

$$x = 0.91349$$

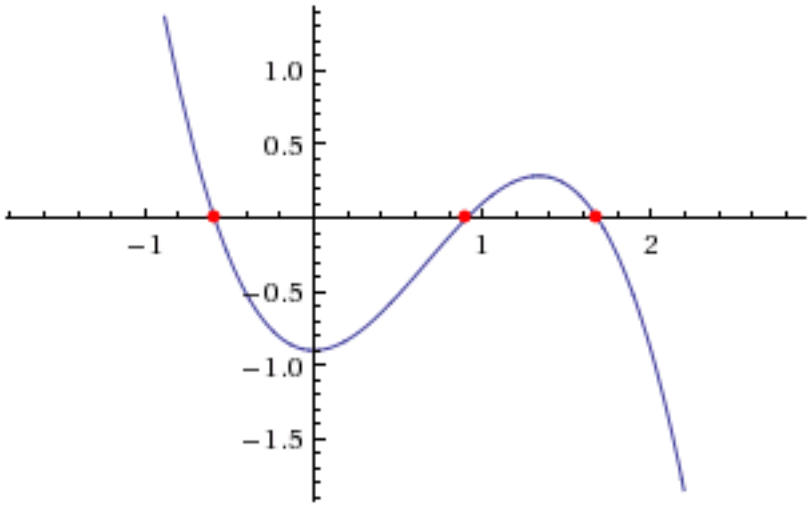
$$x = 7.7892$$

-1 2 0 -0.9

Input:

$$-x^3 + 2x^2 - 0.9 = 0$$

Root plot:



Alternate forms:

$$-(x-2)\,x^2 - 0.9 = 0$$

$$-(x - 1.68181)\,(x - 0.907728)\,(x + 0.589536) = 0$$

Solutions:

$$x = -0.589536$$

$$x = 0.907728$$

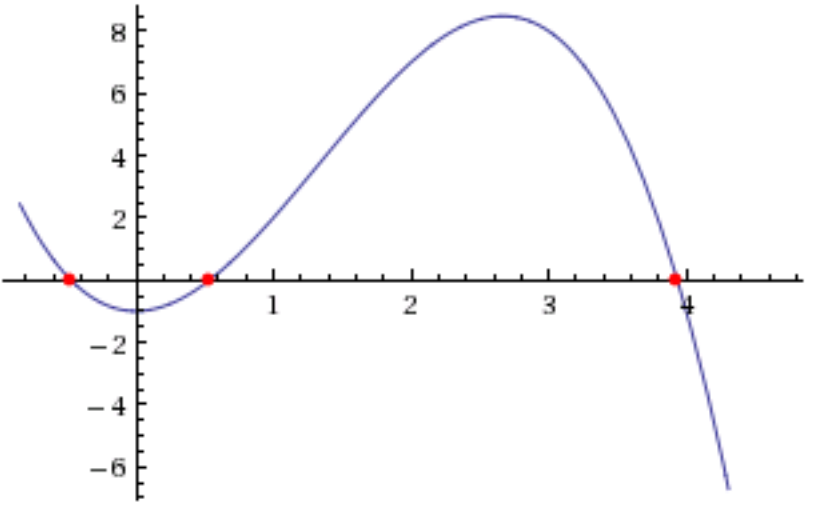
$$x = 1.68181$$

-1 4 0 -1

Input:

$$-x^3 + 4x^2 - 1 = 0$$

Root plot:



Alternate forms:

$$-(x-4)\,x^2 - 1 = 0$$

$$4x^2 - x^3 = 1$$

Solutions:

$$x = -0.47283$$

$$x = 0.53740$$

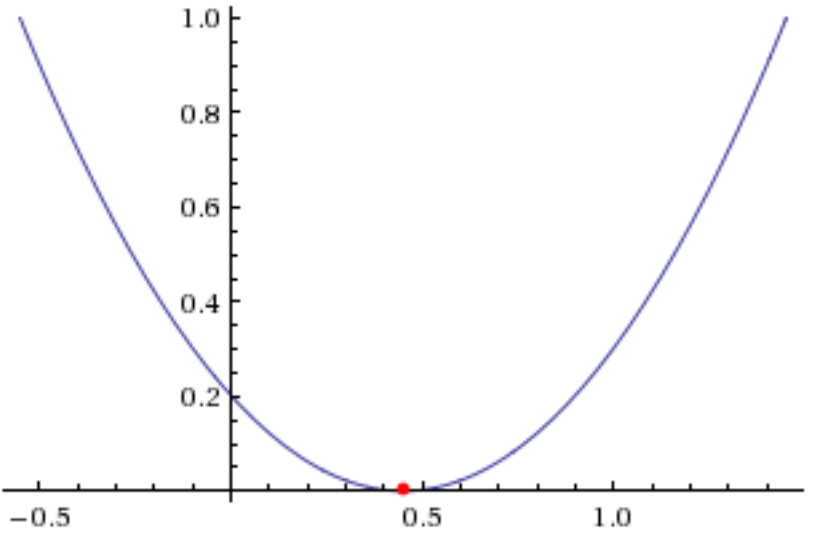
$$x = 3.9354$$

0 1 -0.9 0.2025 (quadratic)

Input:

$$x^2 - 0.9\,x + 0.2025 = 0$$

Root plot:



Alternate forms:

$$(x - 0.9)\,x + 0.2025 = 0$$

$$(x - 0.45)^2 + 0. = 0$$

$$x^2 - 0.9\,x + 0.2025 = 0$$

Alternate form assuming x is real:

$$(0.2025 + 0.\,i) + x^2 - 0.9\,x = 0$$

Solution:

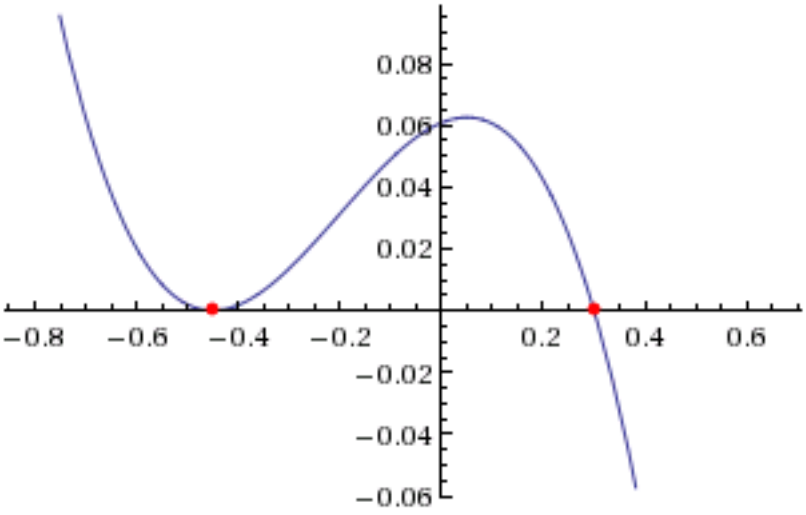
$$x = 0.45$$

-1 -0.6 0.0675 0.06075

Input:

$$-x^3 - 0.6\,x^2 + 0.0675\,x + 0.06075 = 0$$

Root plot:



Alternate forms:

$$0.06075 - x\,(x\,(x + 0.6) - 0.0675) = 0$$

$$-(x - 0.3)\left(x^2 + 0.9\,x + 0.2025\right) = 0$$

$$-(x + 0.2)^3 + 0.1875\,(x + 0.2) + 0.03125 = 0$$

Alternate form assuming x is real:

$$(0.06075 + 0.\,i) - x^3 - 0.6\,x^2 + 0.0675\,x = 0$$

Solutions:

$$x = -0.45$$

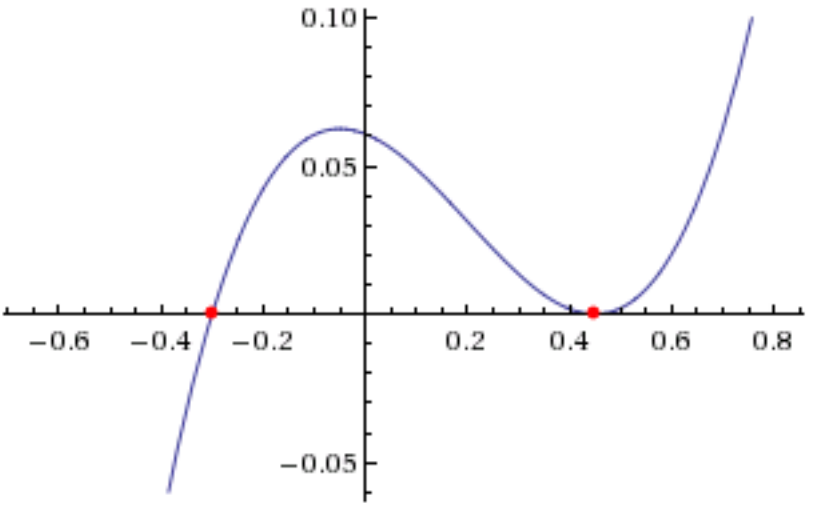
$$x = 0.3$$

1 -0.6 -0.0675 0.06075

Input:

$$x^3 - 0.6\,x^2 - 0.0675\,x + 0.06075 = 0$$

Root plot:



Alternate forms:

$$x\,((x - 0.6)\,x - 0.0675) + 0.06075 = 0$$

$$(x - 0.2)^3 - 0.1875\,(x - 0.2) + 0.03125 = 0$$

$$(x + 0.3)\left(x^2 - 0.9\,x + 0.2025\right) = 0$$

Alternate form assuming x is real:

$$(0.06075 + 0.\,i) + x^3 - 0.6\,x^2 - 0.0675\,x = 0$$

Solutions:

$$x = -0.3$$

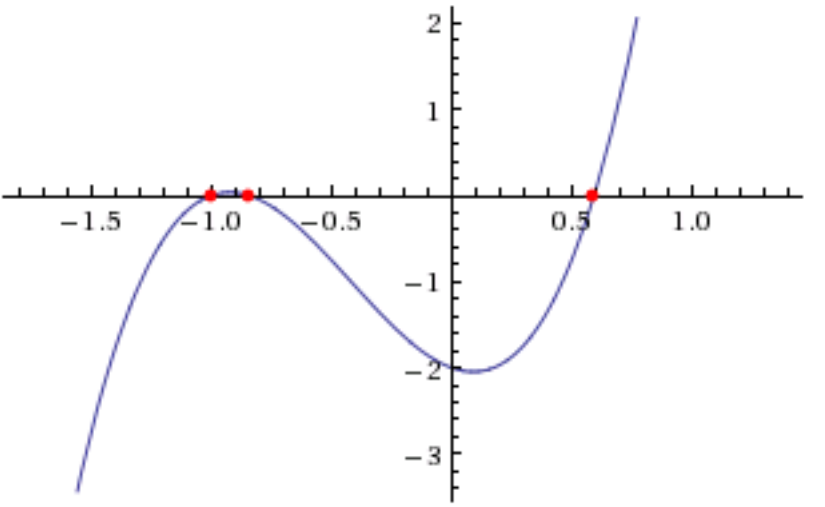
$$x = 0.45$$

4 5 -1 -2

Input:

$$4x^3 + 5x^2 - x - 2 = 0$$

Root plot:



Alternate forms:

$$x^2(4x+5) = x+2$$

$$(x+1)\left(4x^2 + x - 2\right) = 0$$

$$4\left(x + \frac{5}{12}\right)^3 - \frac{37}{12}\left(x + \frac{5}{12}\right) - \frac{217}{216} = 0$$

Solutions:

$$x = -1$$

$$x = -0.84307$$

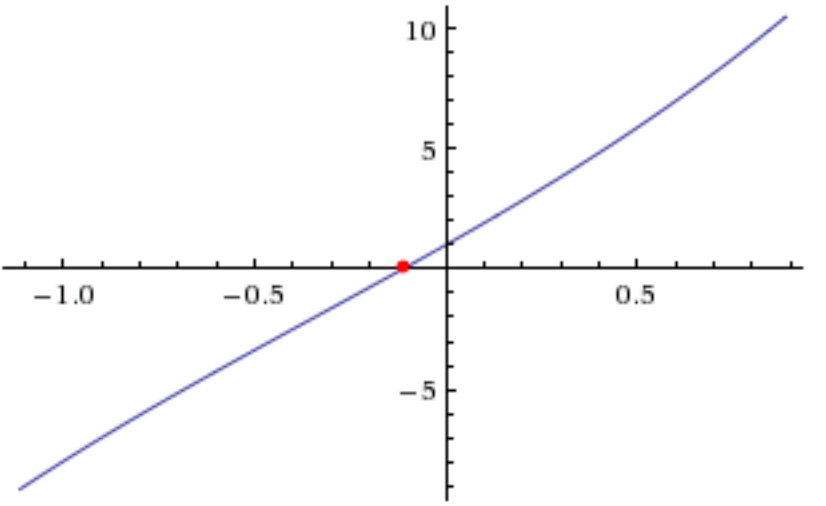
$$x = 0.59307$$

1191

Input:

$$x^3 + x^2 + 9x + 1 = 0$$

Root plot:



Alternate forms:

$$x^3 + x^2 + 9x = -1$$

$$x\left(x^2 + x + 9\right) + 1 = 0$$

$$\left(x + \frac{1}{3}\right)^3 + \frac{26}{3}\left(x + \frac{1}{3}\right) - \frac{52}{27} = 0$$

Real solution:

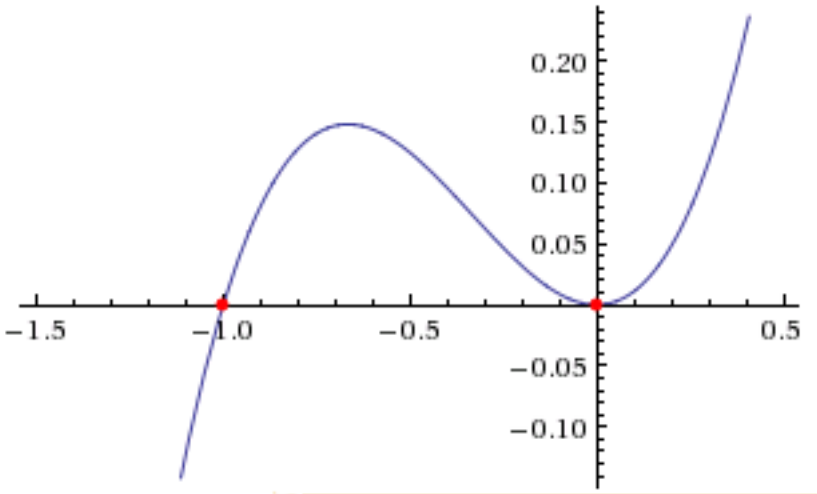
$$x = -0.11236$$

1 0.9996 0 0

Input:

$$x^3 + 0.9996\,x^2 = 0$$

Root plot:



Alternate forms:

$$x^2\,(x + 0.9996) = 0$$

$$x^2\,(x + 0.9996) = 0$$

Alternate form assuming x is real:

$$x^3 + 0.9996\,x^2 + 0.\,i = 0$$

Solutions:

$$x = -0.9996$$

$$x = 0$$