

Find Zeros of Functions, Integration, Differentiation

In the Mathematics>>Script & Formula>>Zeros palette, we have these functions to find the zero of a function:

- 1. Find All Zeros of $f(x)$**
- 2. New Raphson Zero Finder**
- 3. Ridders Zero Finder**
- 4. nD Nonlinear System Single Solution: n-D variables**
- 5. nD Nonlinear System Solver: n-D variables**

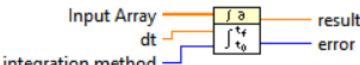
In addition, for polynomial, on Mathematics>>Polynomial palette

- 6. Polynomial Roots:** find the zero pf $f(x)$
- 7. Polynomial Real Zeros Counter Vis:** find the number of the roots.

8. Numeric Integration

Context Help

NI_AALPro.lvlib:1D Numeric Integration.vi



Input Array — result
dt — error
integration method

Performs numeric integration on the **Input Array** using one of four popular numeric integration methods.


Wire data to the **Input Array** input to determine the polymorphic instance to use or manually select the instance.

[Detailed help](#)

9. Numeric Derivative x(t)

Context Help

Derivative x(t).vi



X — dX/dt
Initial Condition — error
Final Condition
dt
method

Performs a discrete differentiation of the sampled signal **X**.

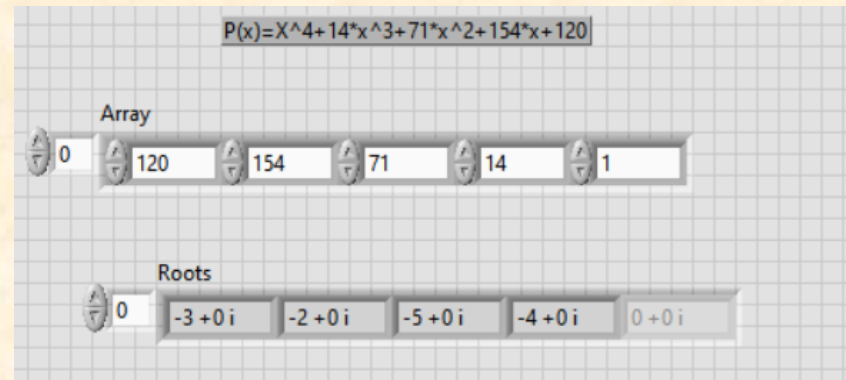
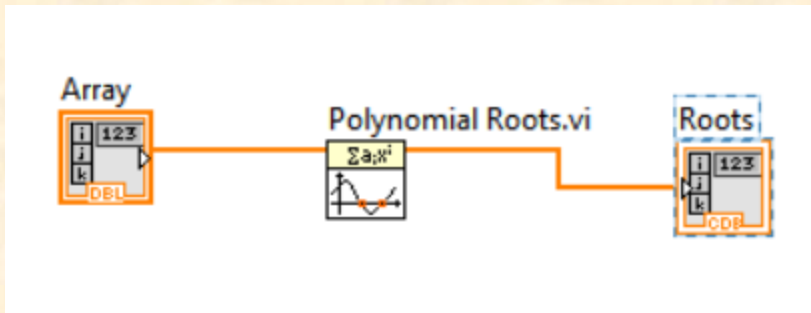
[Detailed help](#)

Assignment 1

Find the zero for the polynomial

$$P(x)=x^4+14*x^3+71*x^2+154*x+120=0.$$

Using the **Mathematics/Script & Formula/Zeros/Polynomial Roots.vi**

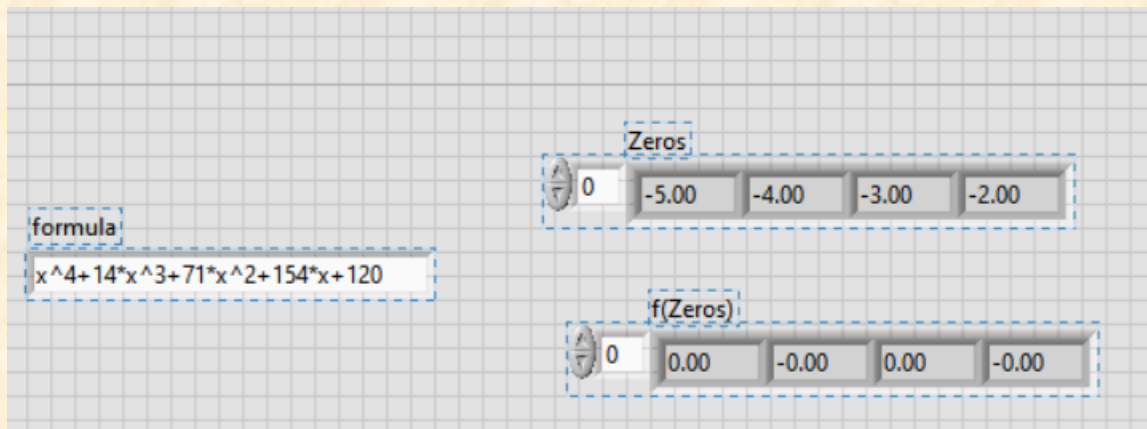
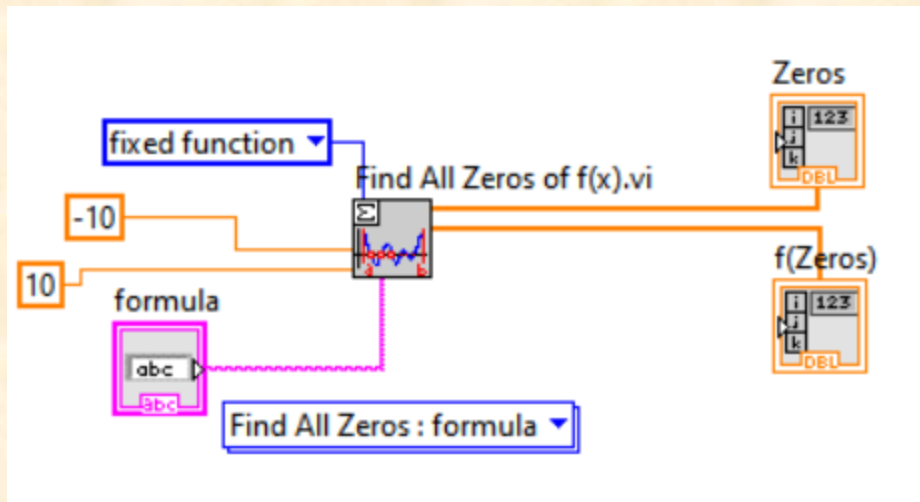


Assignment 2

Find the zero for the equation

$$P(x)=x^4+14*x^3+71*x^2+154*x+120=0.$$

Using the **Find All Zero of f(x).vi**



Assignment 3

Use the **nD Nonlinear System Single Solution** function to find the solution of the following equations:

The interface is set up to solve a system of four equations for variables x, y, z, and a. The equations are:

$$\begin{aligned}x + y + z - 3 + \cos(x \cdot y) &= 0 \\x - y + z - 1 + x \cdot y \cdot z &= 0 \\x - y - z + 1 - a &= 0 \\\cos(a + x - y) &= 0\end{aligned}$$

The interface includes the following controls and displays:

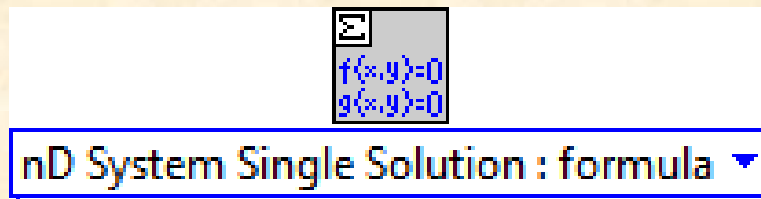
- Start:** A vertical list of four input fields containing the values 0, 0, 0, and 1.
- End:** A vertical list of four input fields containing the values 2, 2, 2, and 2.
- X:** A vertical list of four input fields containing the variables x, y, z, and a.
- F(X):** A vertical list of four input fields containing the equations: $x+y+z-3+\cos(x*y)$, $x-y+z-1+x*y*z$, $x-y-z+1-a$, and $\cos(a+x-y)$. To the right of this list is an equals sign followed by a zero.
- Number of Trials:** A numeric input field set to 12.
- Chosen Zero:** A numeric input field set to 0.
- Note:** "After any calculation you have to choose the zeroes. There can be more than one solution."
- Zero:** A numeric input field set to 0 and a table with four empty rows.
- F(zero):** A numeric input field set to 0 and a table with four empty rows.
- Zeros:** A button to execute the calculation.
- Stop:** A red square button to stop the process.

Hint:

1). You can refer to the example code **Equation Explorer.vi**, located in the folder

C:\Program Files\National Instruments\LabVIEW 2023\examples\Mathematics\Scripts and Formulas

2). You only need to **directly** wire the associated input and output terminals of this function.



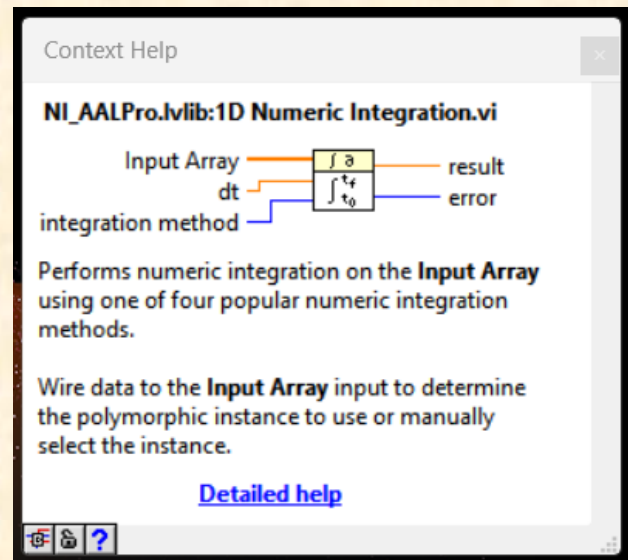
Assignment 4: Numeric Integration

Use the **Numeric Integration.vi** function to calculate the integral of

$x(t)=t^3+t^2$, between the range $0 \leq t \leq 20$, with sampling step 0.25 .

Also, use the XY Graph to show the plot of the $x(t)$ in the range.

Hint: using a for loop the sample the $x(t)$ in the range of t .



Assignment 5: Derivate $x(t)$

Use the **Derivative $x(t)$.vi** function to find the derivative of $x(t)=t^3+t^2$, between the range $0 \leq t \leq 20$, with sampling step 0.5 .

Also, use the XY Graph to show the plot of the $x(t)$ in the range.

Hint: using a for loop the sample the $x(t)$ in the range of t .

