LabVIEW Formula Node

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LabVIEW Formula Node

**Formula Node**: Create and use C code within LabVIEW

Example:

```
#include <math.h>

int32 y;
if(x>=0)
  y = 1;
else y = -1;
```

Evaluates mathematical formulas and expressions similar to C on the block diagram. The following built-in functions are allowed in formulas: abs, acos, acosh, asin, asinh, atan, atan2, atanh, ceil, cos, cosh, cot, csc, exp, expm1, floor, getexp, getman, int, intrz, ln, ln1p, log, log10, log2, max, min, mod, pow, rand, rem, sec, sign, sin, sinc, sinh, sizeOfDim, sqrt, tan, tanh. There are some differences between the parser in the Mathematics VIs and the Formula Node.

Detailed help

Very useful for mathematical expressions and simulations (implementing discrete equations)!
LabVIEW Formula Node Example

Celsius to Fahrenheit:

\[ T_F = \frac{9}{5} T_C + 32 \]

We will use the LabVIEW Formula Node in order to implement this formula.
Celsius to Fahrenheit - Example

Here we have used ordinary LabVIEW functionality. Let's try to use the Formula Node instead.
Celsius to Fahrenheit - Example

\[ Tf = \left( \frac{Tc \times 9}{5} \right) + 32 \]
LabVIEW Formula Node

Advanced Mathematical Formula:

\[ f(x) = \frac{\ln(ax^2 + bx + c) - \sin (ax^2 + bx + c)}{4\pi x^2 + \cos (x - 2)(ax^2 + bx + c)} \]

Given \( a = 1, b = 3, c = 5 \)

Find \( f(9) \)

We will use the LabVIEW Formula Node in order to implement this formula

(The answer should be \( f(9) = 0.0044 \))
TRY IT OUT!
Solutions

Note!

Alternative Solution:

\[ f(x) = \frac{\ln(ax^2 + bx + c) - \sin(ax^2 + bx + c)}{4\pi x^2 + \cos(x - 2)(ax^2 + bx + c)} \]

float g;

g = a*x*x + b*x + c;

f = (ln(g) - sin(g)) / (4*pi*x*x + cos(x-2)*(g));

Which Solution do you think is best?
LabVIEW MathScript Node and LabVIEW MATLAB Node

• They use MATLAB Syntax
• More powerful features regarding Arrays and Matrices
• You can use hundreds/thousands of built-in functions
• MathScript Node:
  – You need to have LabVIEW MathScript RT Module installed
  – MathScript is an add-on to LabVIEW, and it includes a “miniature” version of MATLAB

• MATLAB Node:
  – You need to have MATLAB installed on your computer
  – Works only for Windows (it uses ActiveX)
LabVIEW MathScript Window

```
>> clear
>> x = 0:10
x =
7   8   9  10  1  2  3  4  5  6
>> y = 2*x+1
y =
15  17  19  21  5  7  9  11  13
>> plot(x,y)
```
LabVIEW MathScript Node

```
1 x = 0 : 10;
2 y = 3*x + 2;
4 plot(x, y)
```
LabVIEW MATLAB Node

The diagram shows the process of integrating MATLAB script into LabVIEW. On the left, the Scripts & Formulas window displays various nodes, including MathScript, Formula Node, and Formula Parsing. The selected node is the Script Nodes. On the right, the MATLAB script window contains the following code:

```matlab
x=0:10
y=3*x + 2;
plot(x,y)
```
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