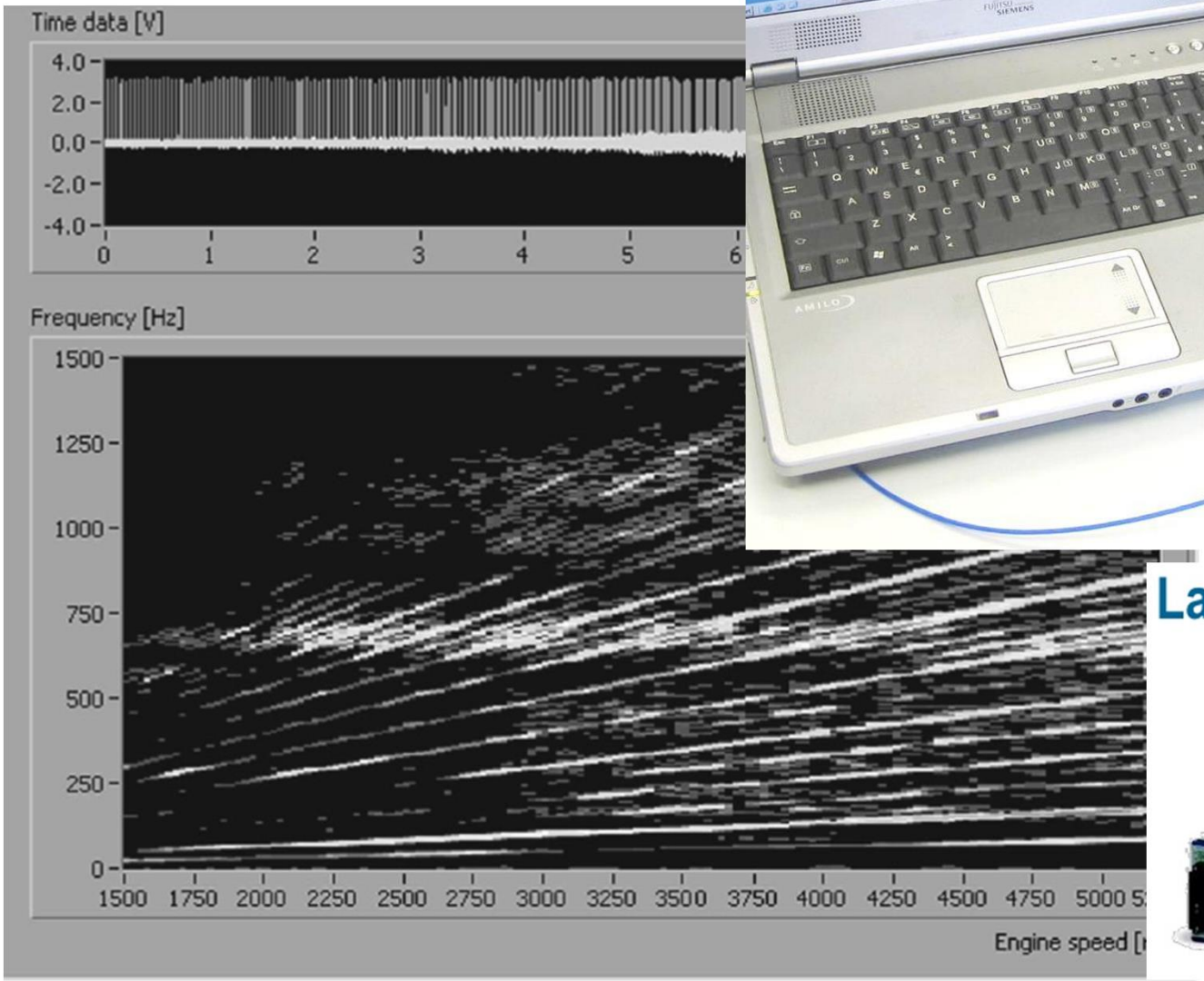
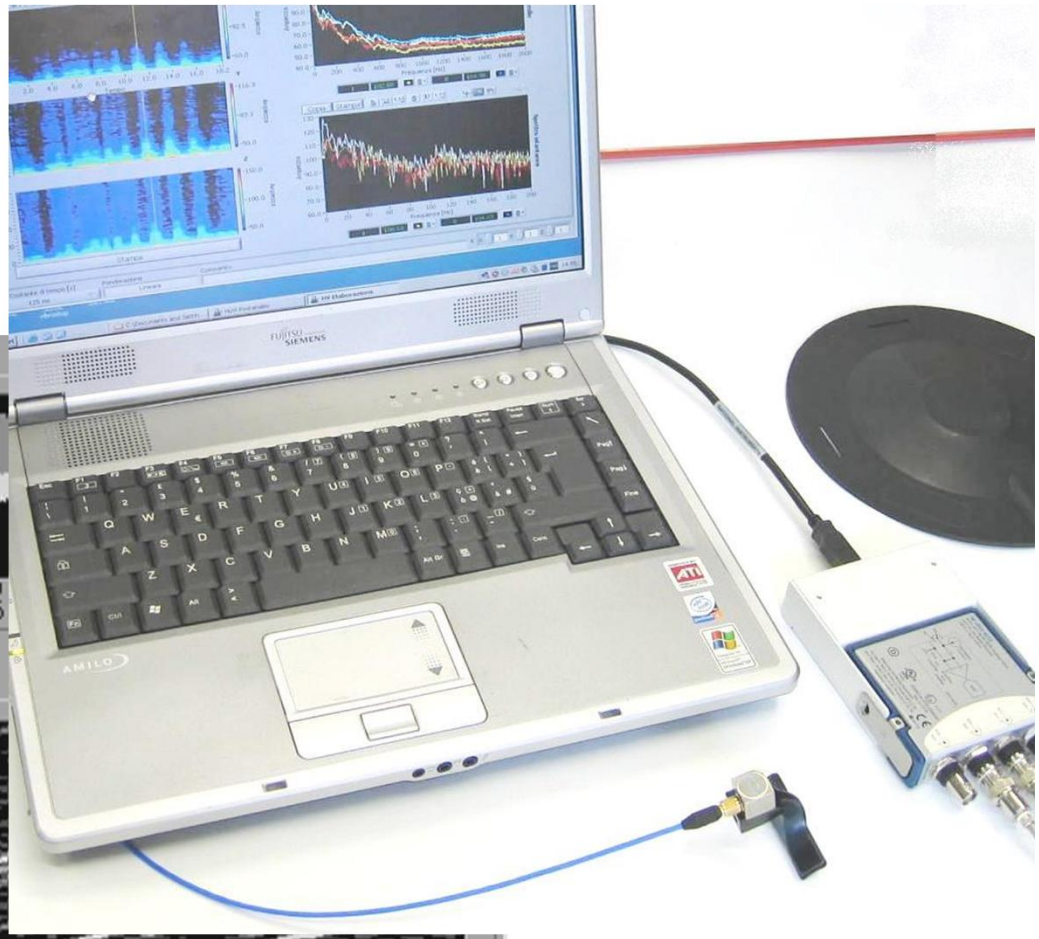
MERNI INFORMACIONI SISTEMI

Profesor dr Miroslav Lutovac

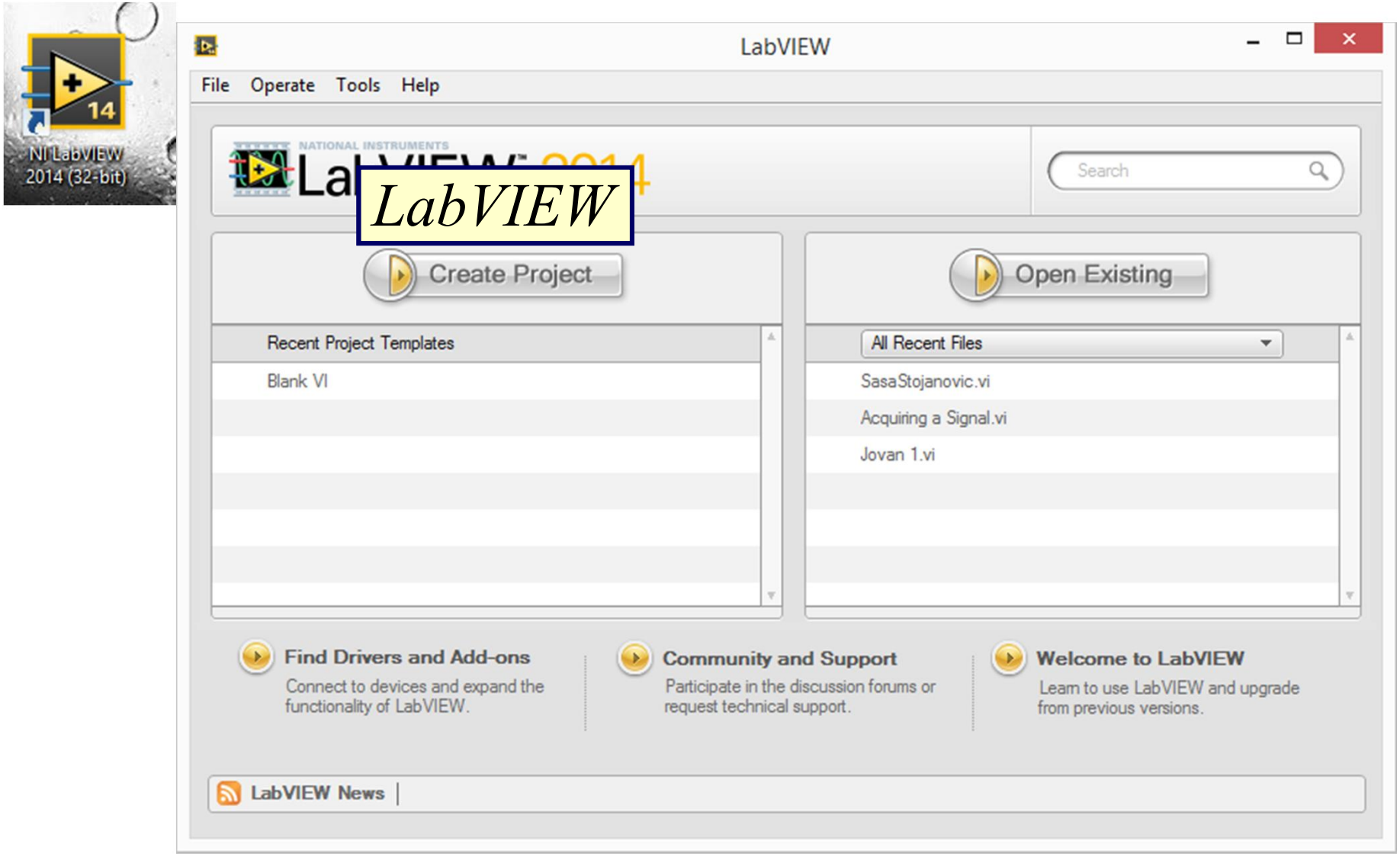
mlutovac@viser.edu.rs

Učenje kroz primere

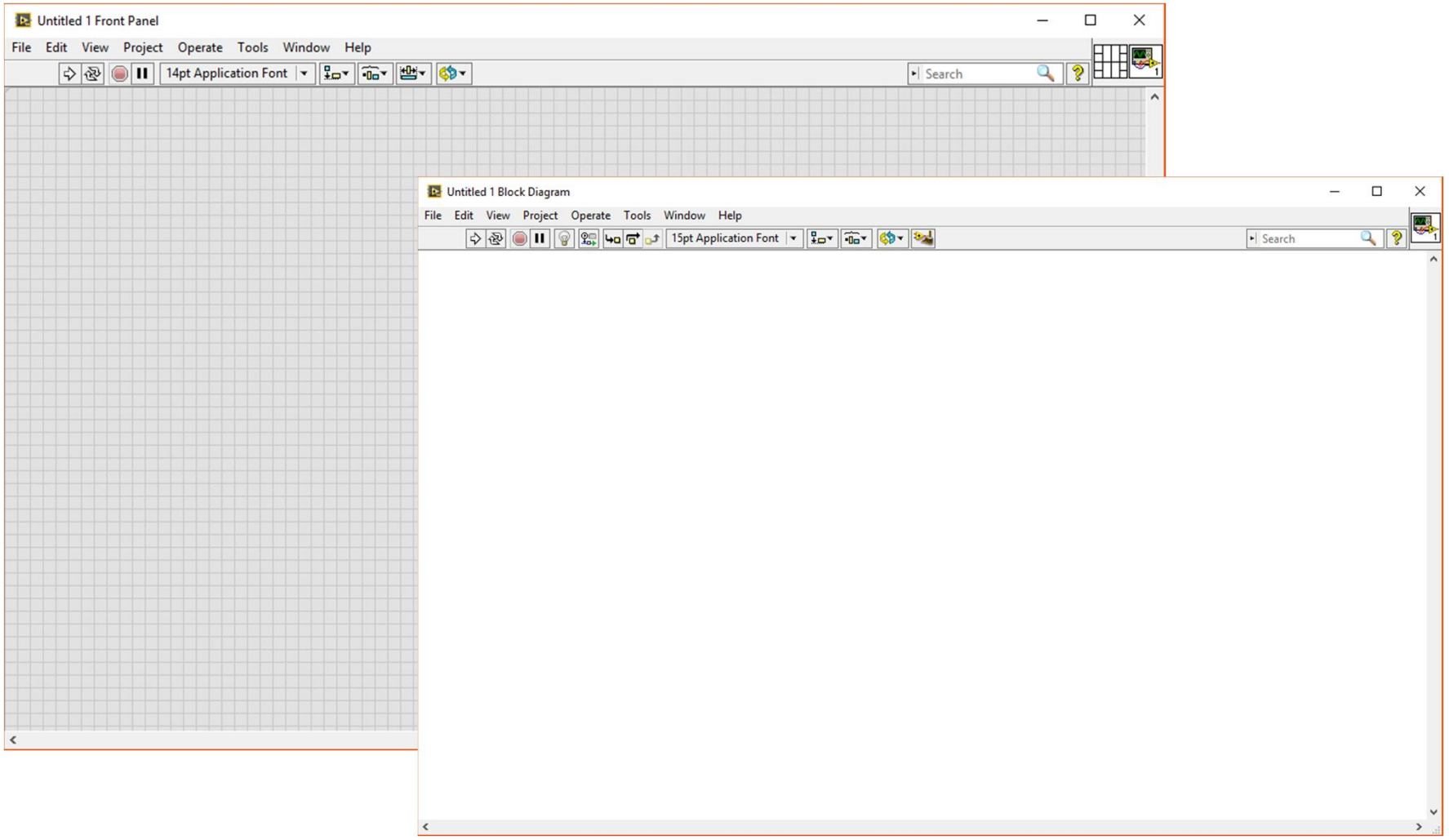




LabVIEW SignalExpress


NI LabVIEW
2014 (32-bit)
LabVIEW
File Operate Tools Help
NATIONAL INSTRUMENTS
LabVIEW 2014
Search
LabVIEW
Create Project
Open Existing
Recent Project Templates
Blank VI
All Recent Files
SasaStojanovic.vi
Acquiring a Signal.vi
Jovan 1.vi
Find Drivers and Add-ons
Connect to devices and expand the functionality of LabVIEW.
Community and Support
Participate in the discussion forums or request technical support.
Welcome to LabVIEW
Learn to use LabVIEW and upgrade from previous versions.
LabVIEW News

Launch LabVIEW and click on Blank VI on the Getting Started window. This brings up two windows (gray background - front panel, white background - block diagram).



Click on the front-panel

Click on View>Controls Palette

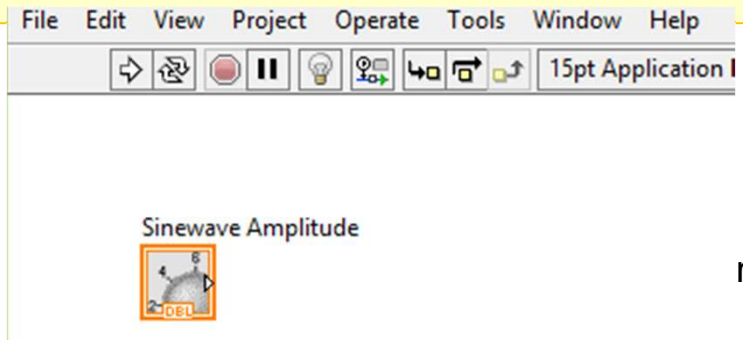
Click on Express>Numeric Controls>Dial

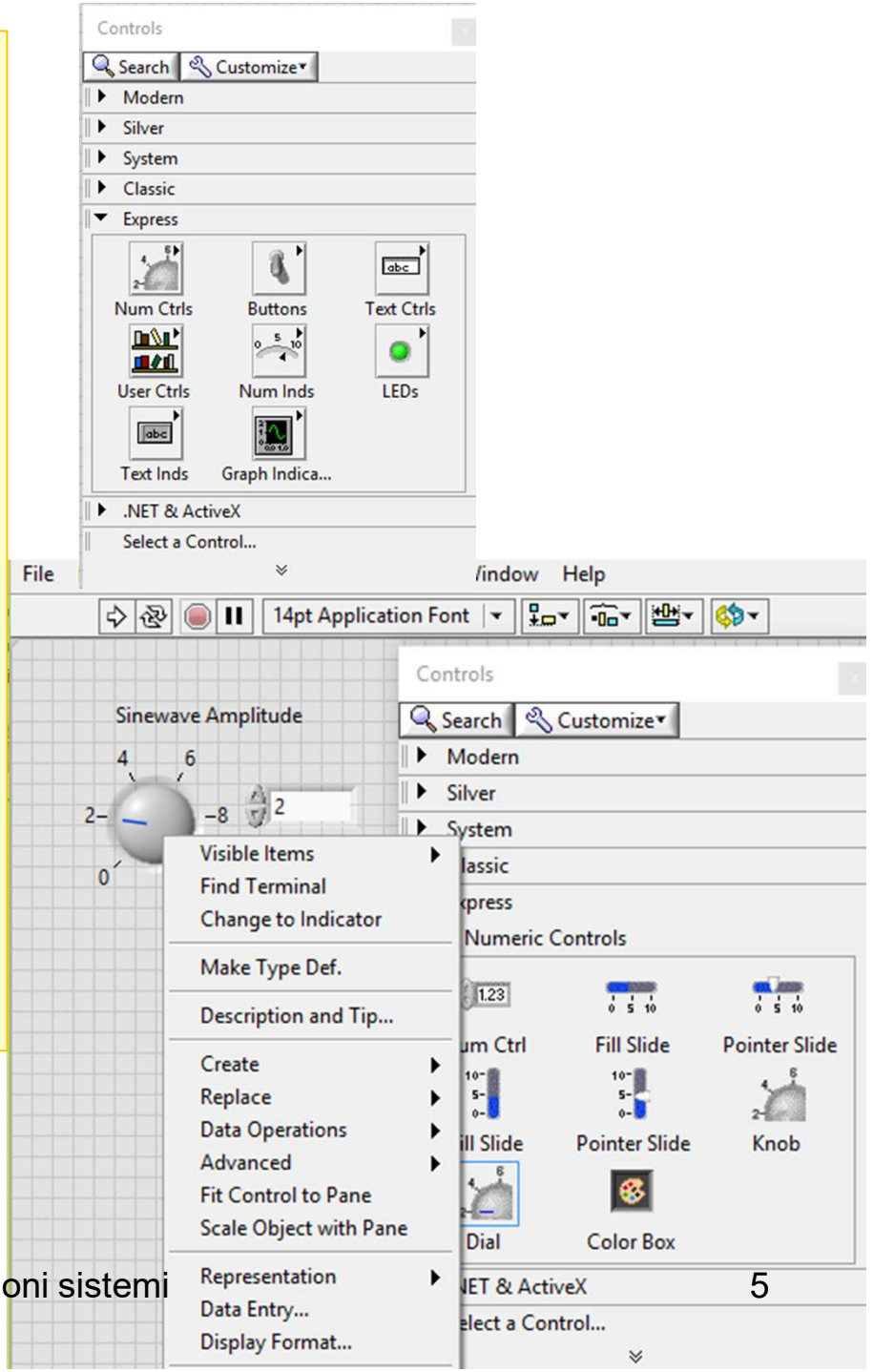
Move the cursor to position the dial in the front-panel window

Click to drop it into place

Type in Sinewave Amplitude from keyboard

Place the cursor on the dial, right-click and select Visible Items>Digital Display



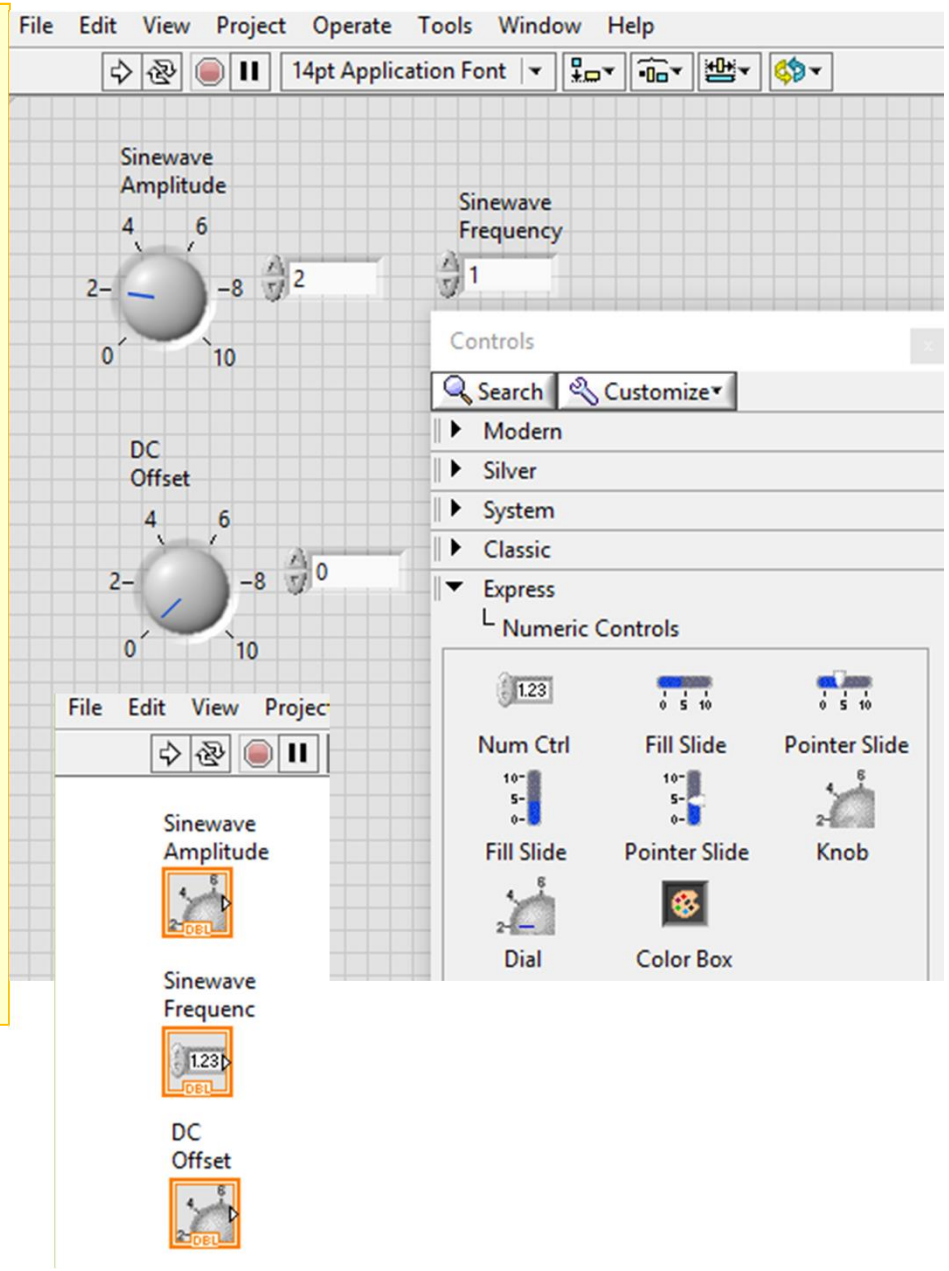


Click on the diagram window (Window>
Show Block Diagram)

Click on View>Tools Palette

Return to the front panel

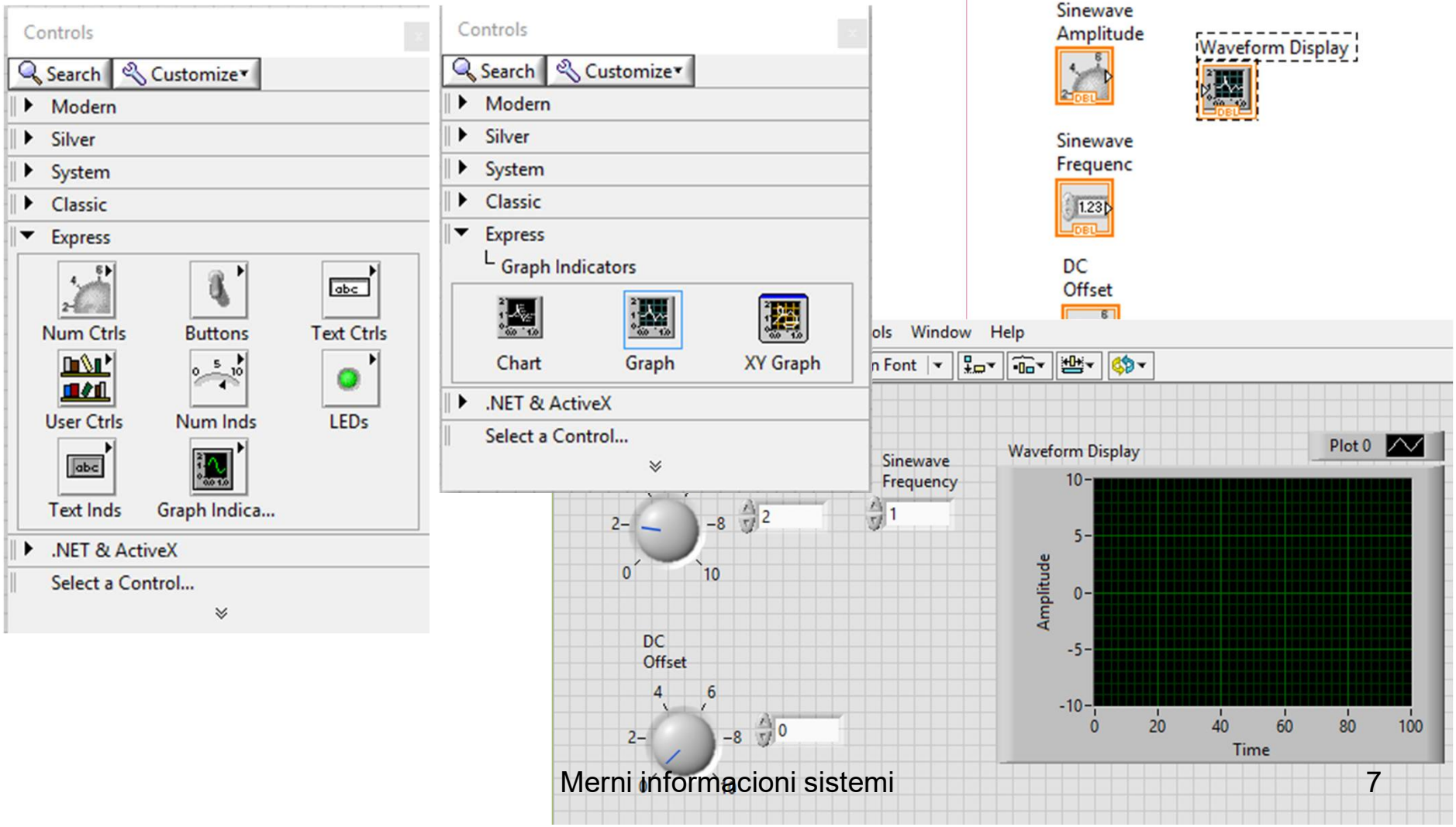
Place a second dial labeled DC Offset and a numeric control (upper left-hand corner of the numeric controls palette) labeled Sinewave Frequency on the front panel



Click on Express>Graph Indicators >Waveform Chart

Place the waveform chart on the front panel

Type in the caption Waveform Display on your keyboard

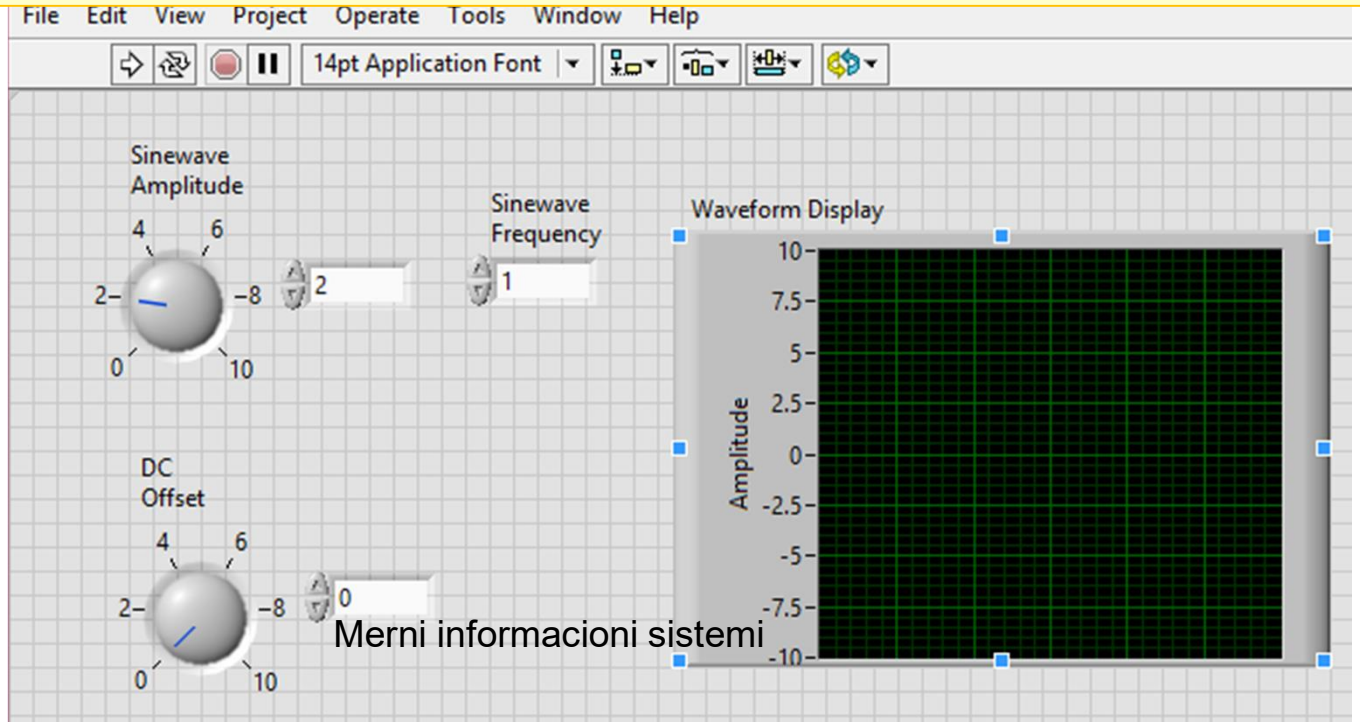


Place the cursor on the display icon and click the right mouse button to bring up the pop-up menu

Use the Visible Items>PlotLegend and Visible Items>X Scale commands to hide the legend and the x-axis scale

Use the Position/Size/Select tool to position and resize the elements on the control panel

Use the Operate Value tool to edit the lower and upper y-axis values, so that they range from -10 to +20

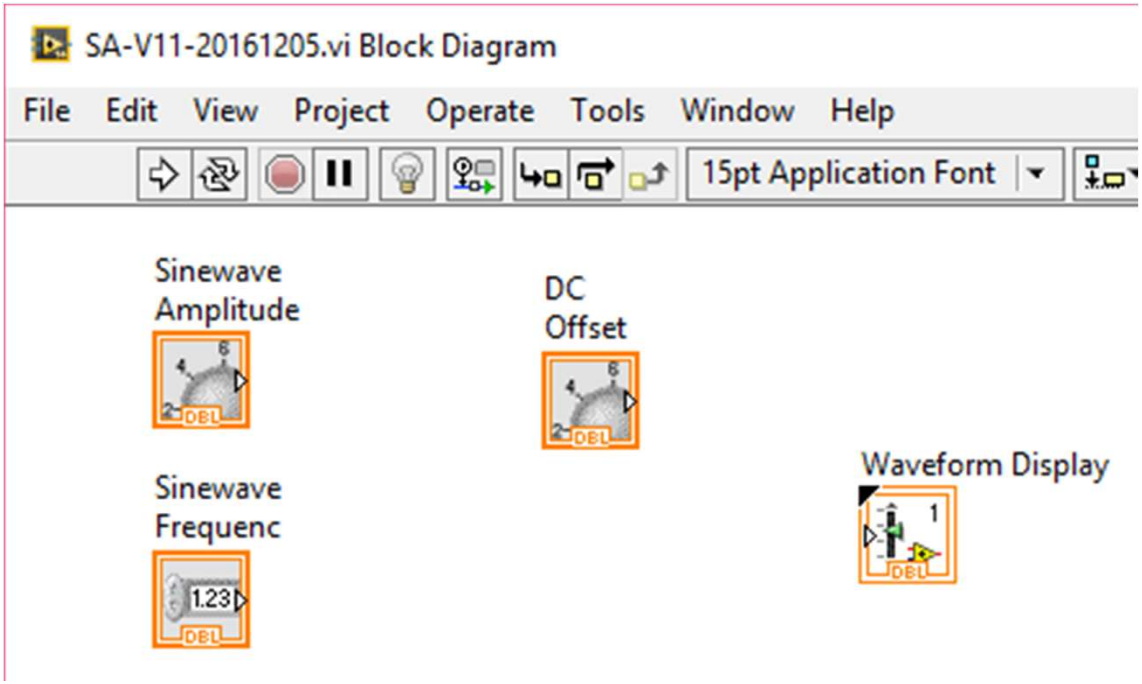


Use the Window>Show Block Diagram command to switch to the block diagram window

Use the View>Functions Palette command to make it visible

Use the Position/Size/Select tool to position the icons

Make sure that when you left-click on each box, the nearest label is the one indicated as being selected



Selecting and positioning function blocks on the block diagram

Addition block:**Mathematics>Numeric>Add**

Multiplication block: **Mathematics>Numeric>Multiply**

Division block: **Mathematics>Numeric>Divide**

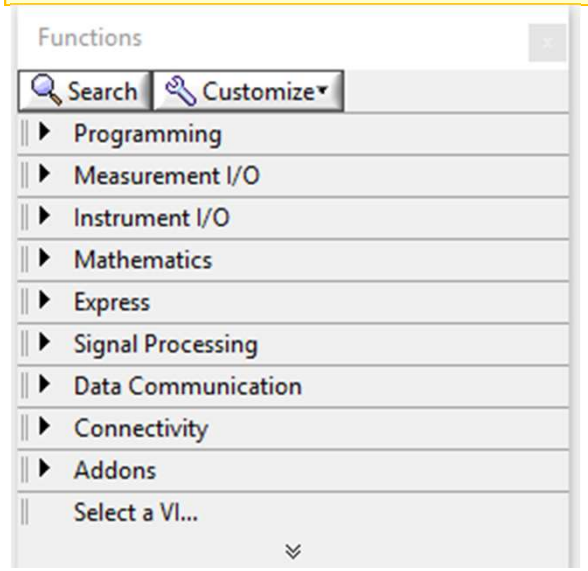
Sine function: **Mathematics>Elementary & Special Functions>Trigonometric**

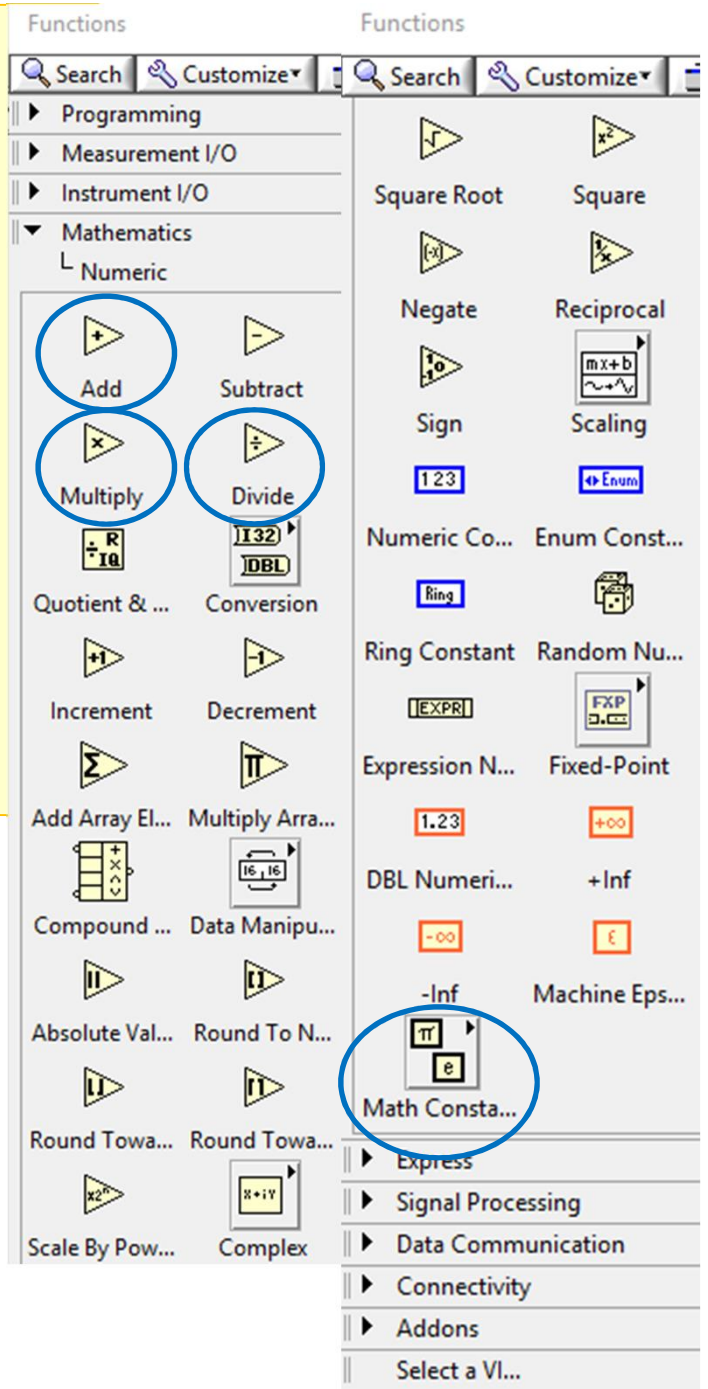
Functions>Sin

2 Block: **Mathematics>Numeric>**
Math & Scientific Constants>2*Pi

Wait Icon: **Programming>Timing>Wait (ms)**

For Loop: **Programming>Structures>For Loop**



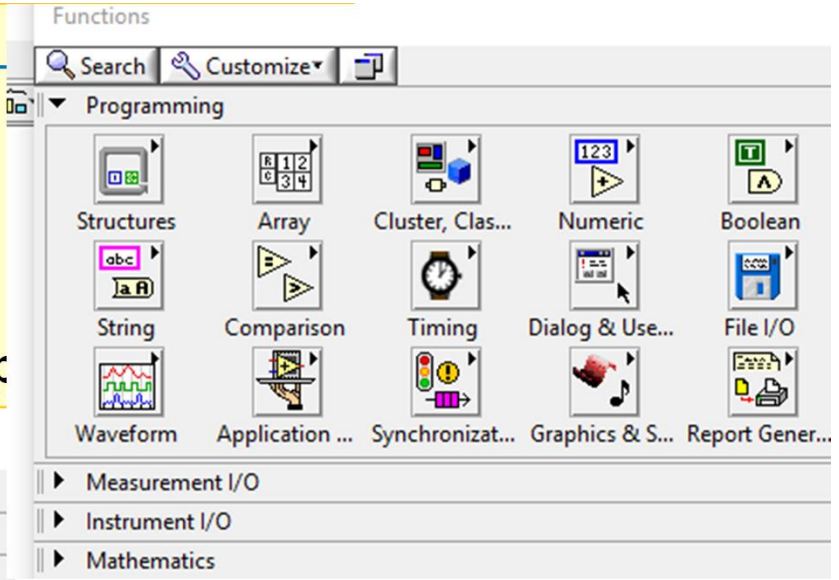


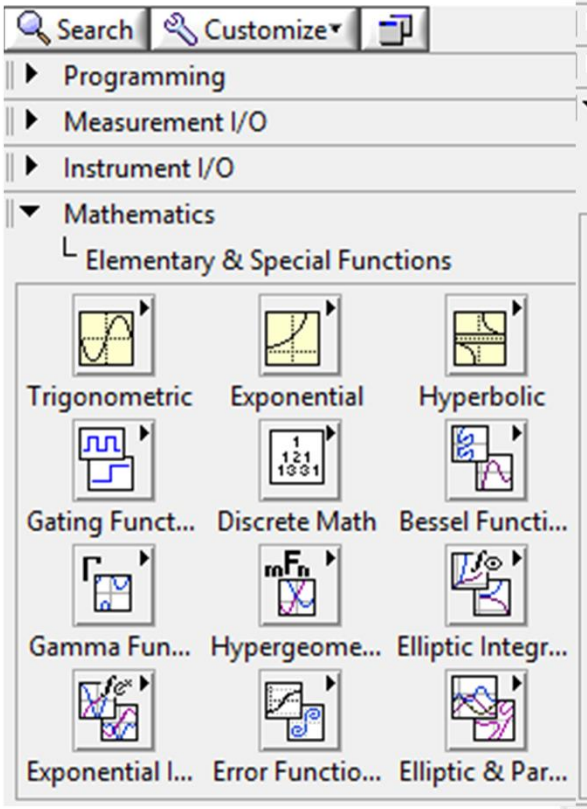
Selecting and positioning function blocks on the

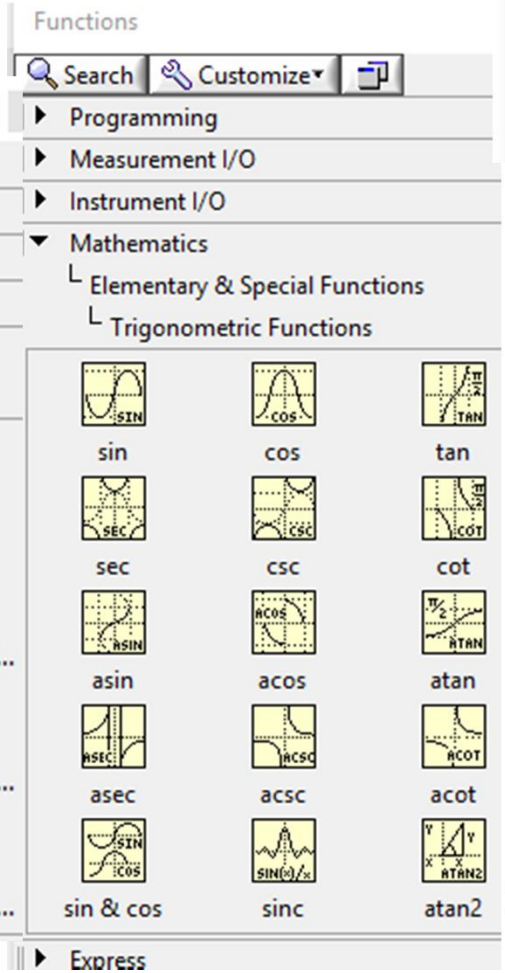
Sine function: **Mathematics>**
Elementary & Special Functions>
Trigonometric Functions>Sin

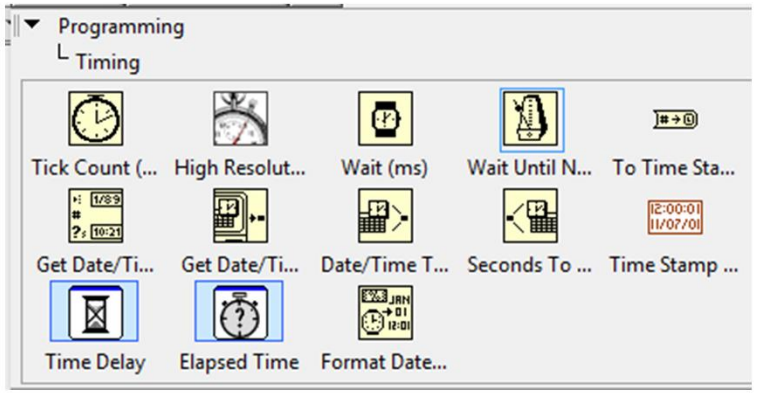
Wait Icon: **Programming>Timing>Wait (ms)**

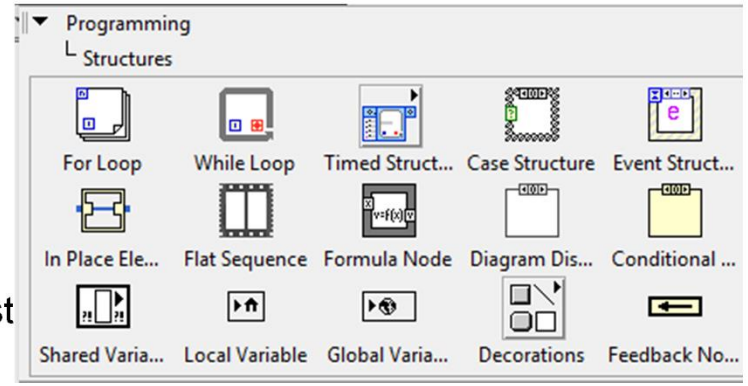
For Loop: **Programming>Structures>For Loop**





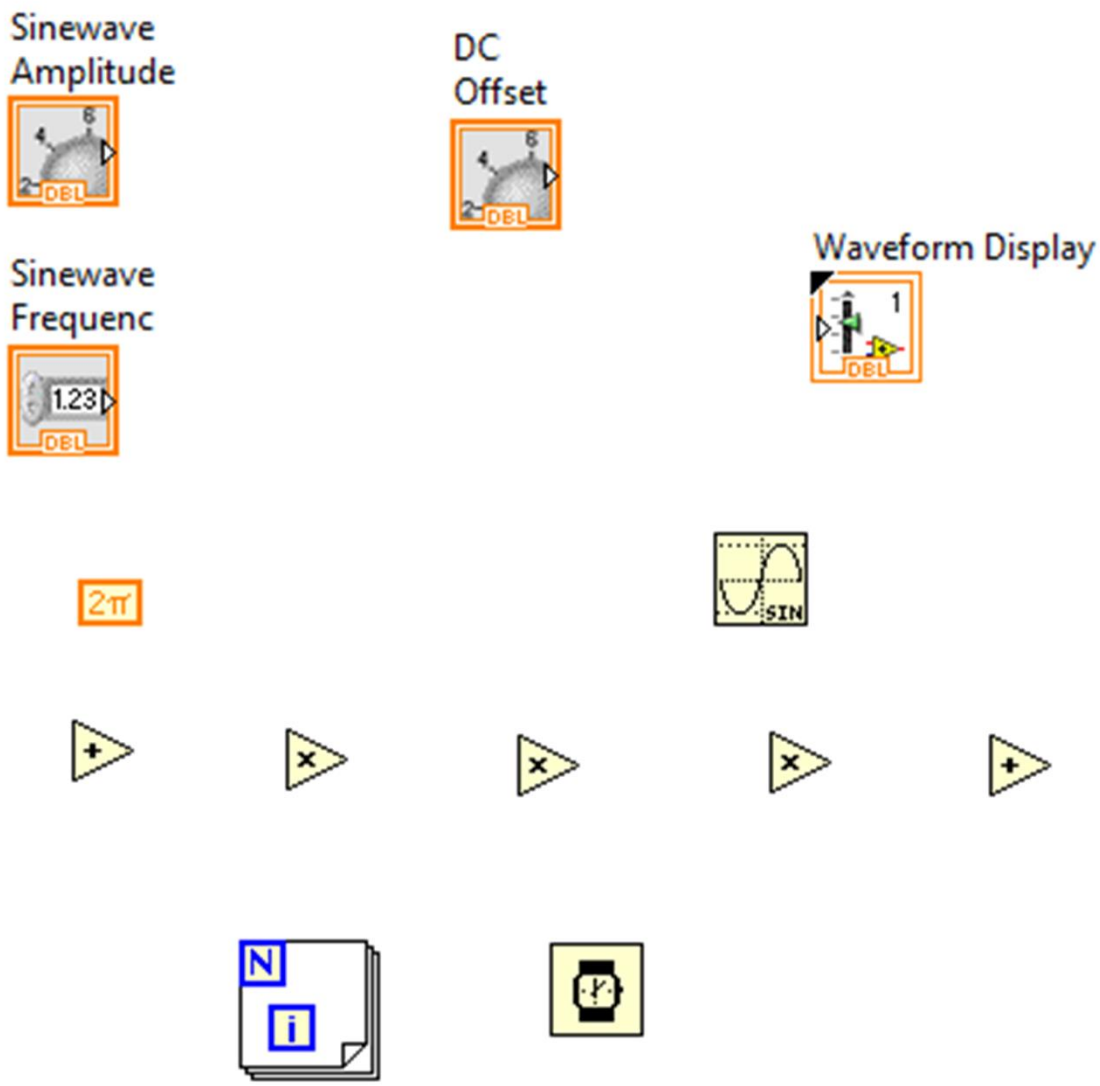




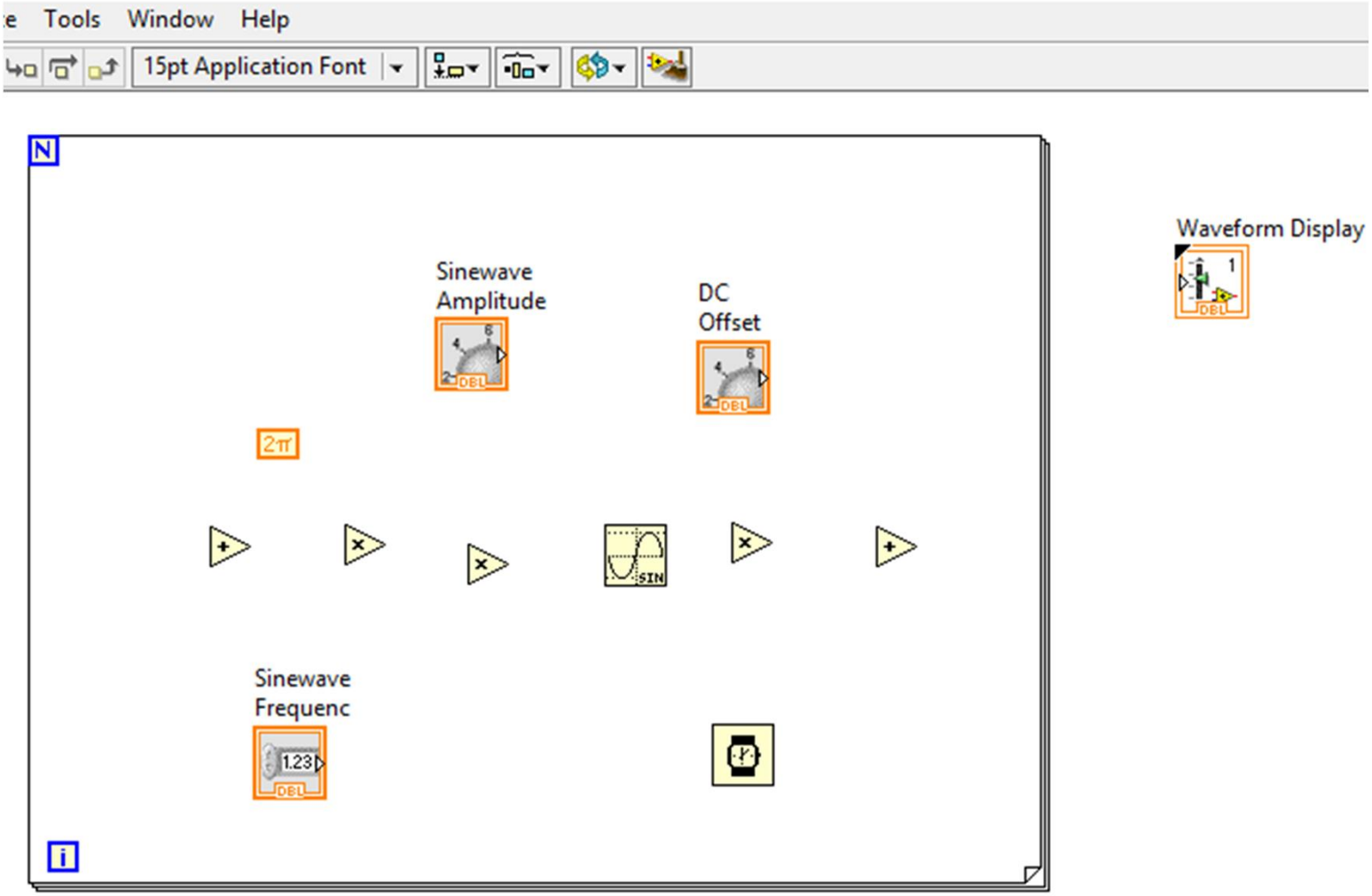


Selecting and positioning function blocks on the block diagram

Addition block:**Mathematics**>**Numeric**>**Add ….**

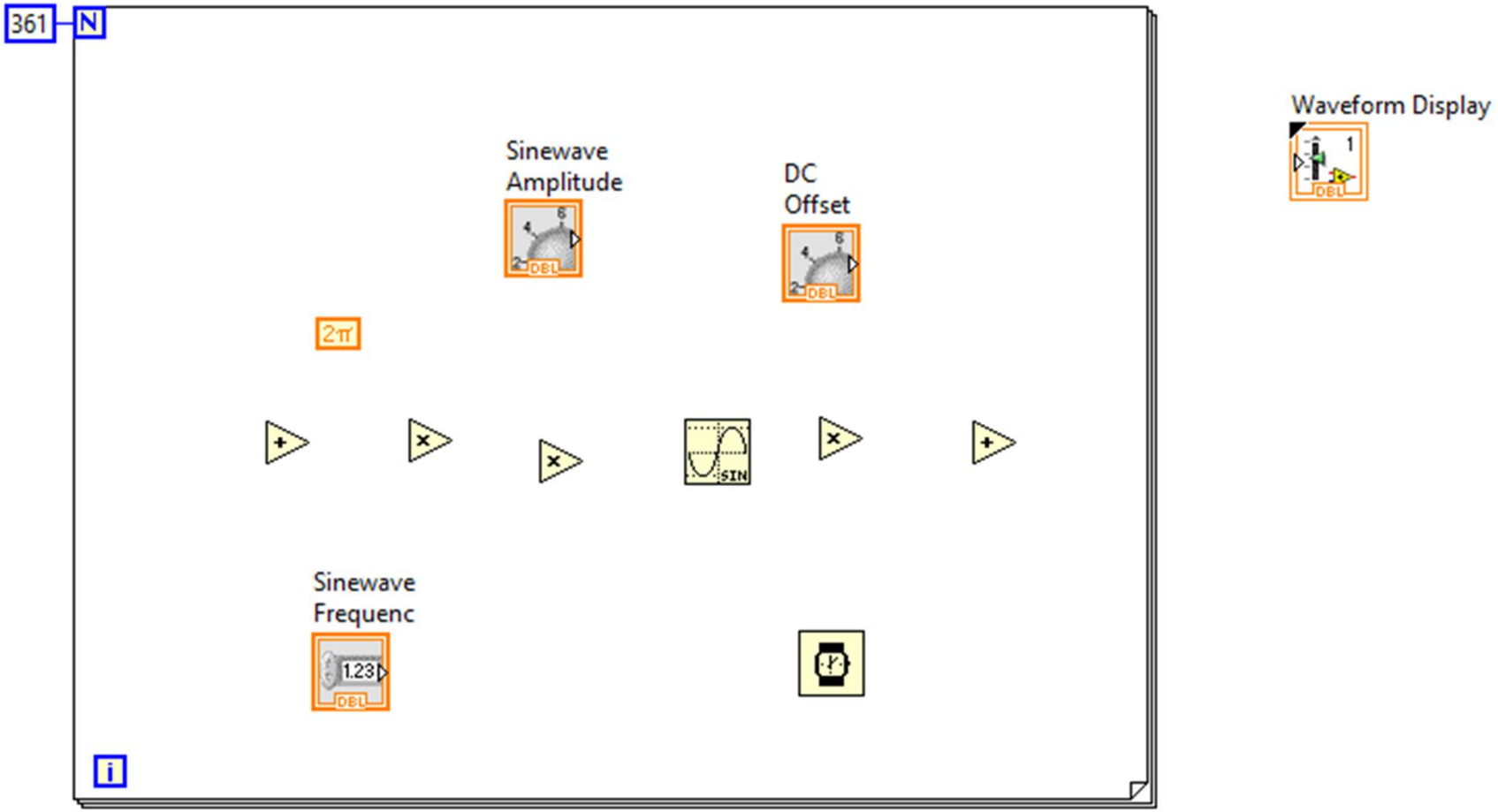


Position the For Loop at the upper left-hand corner of the diagram window
Holding the mouse button down, drag the lower right-hand corner to enclose all of the other icons except the Waveform Display



Add constants and wire the diagram

Right-click on the upper left-hand corner of the for loop, select Create Constant from the pop-up menu, and type in 361

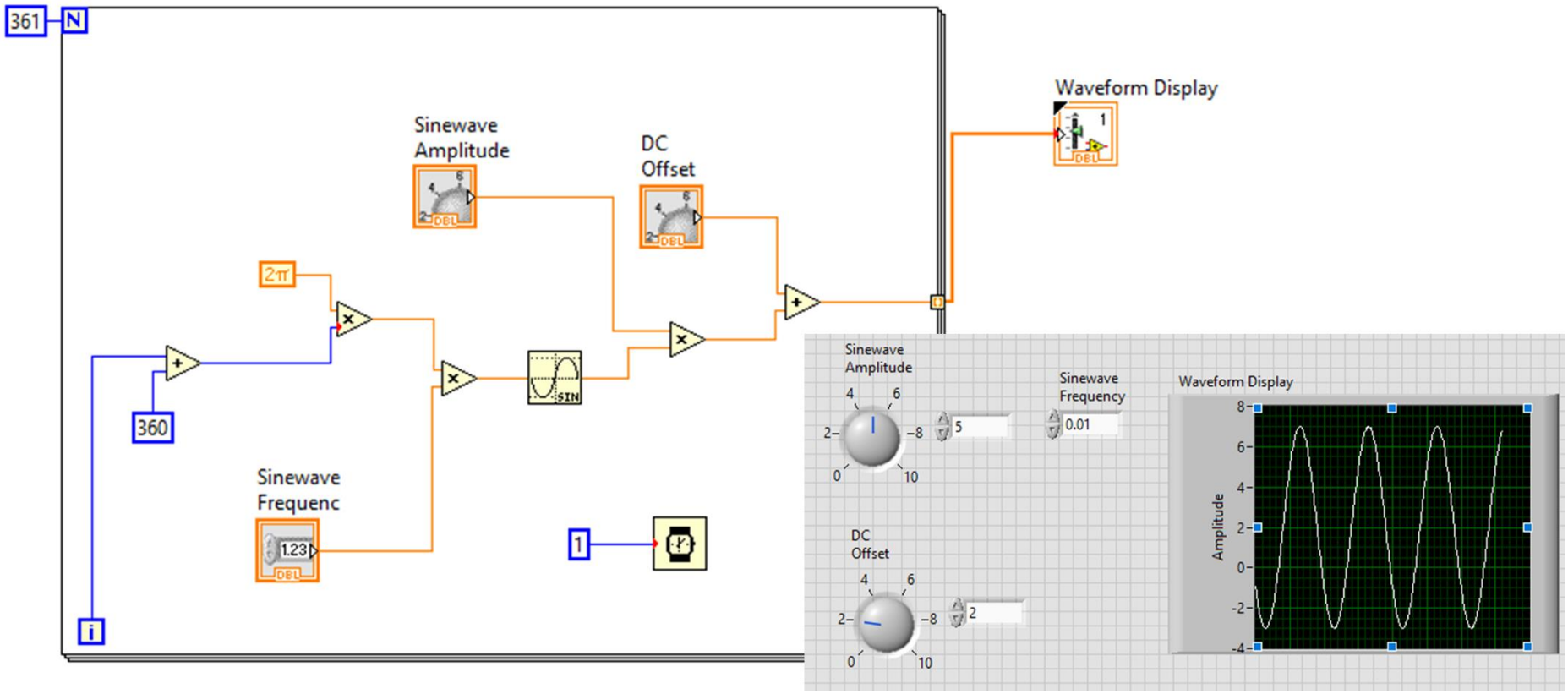


Select the Connect Wire tool from the tools palette

To make a wire connecting the for-loop index (the box labeled *i* in the lower left-hand corner of the for loop) to the divider, click on the for-loop index, move the cursor to the upper input of the divide box, and click

Right-click on the lower input of the divider, select **Create>Constant**, type in 360

Use the **Connect Wire** tool to finish the wiring

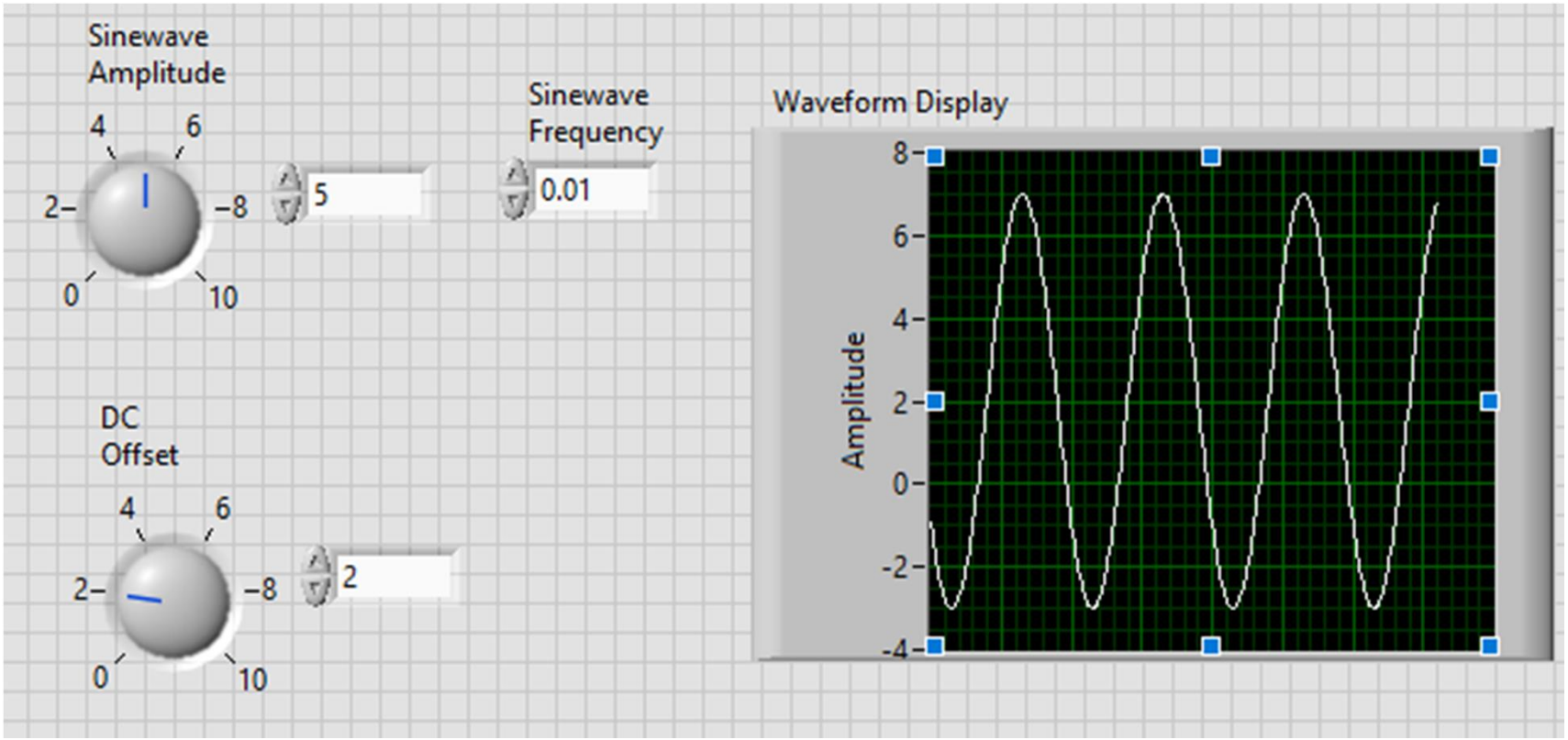


Front panel - click on the run continuously button

Adjust the controls and observe the display

Set the sinewave amplitude to 7, the dc offset to 2, and the frequency to 0.01

Use the **XScale** >**AutoScaleX** command

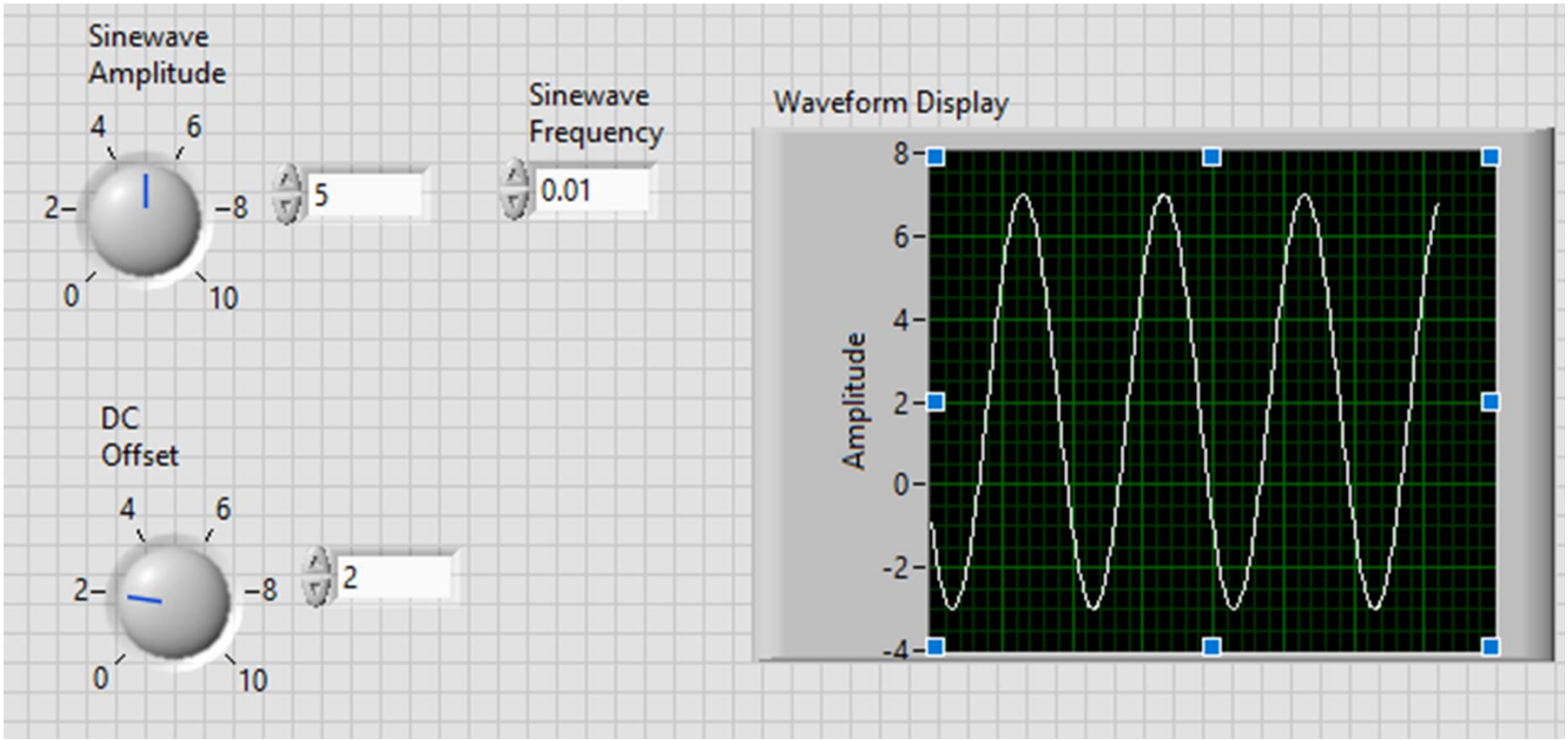


Adjust the amplitude and dc offset:

a)Point to and rotate the dial.

b)Click on the up or down arrows on the left-hand side of the digital indicator under the dial

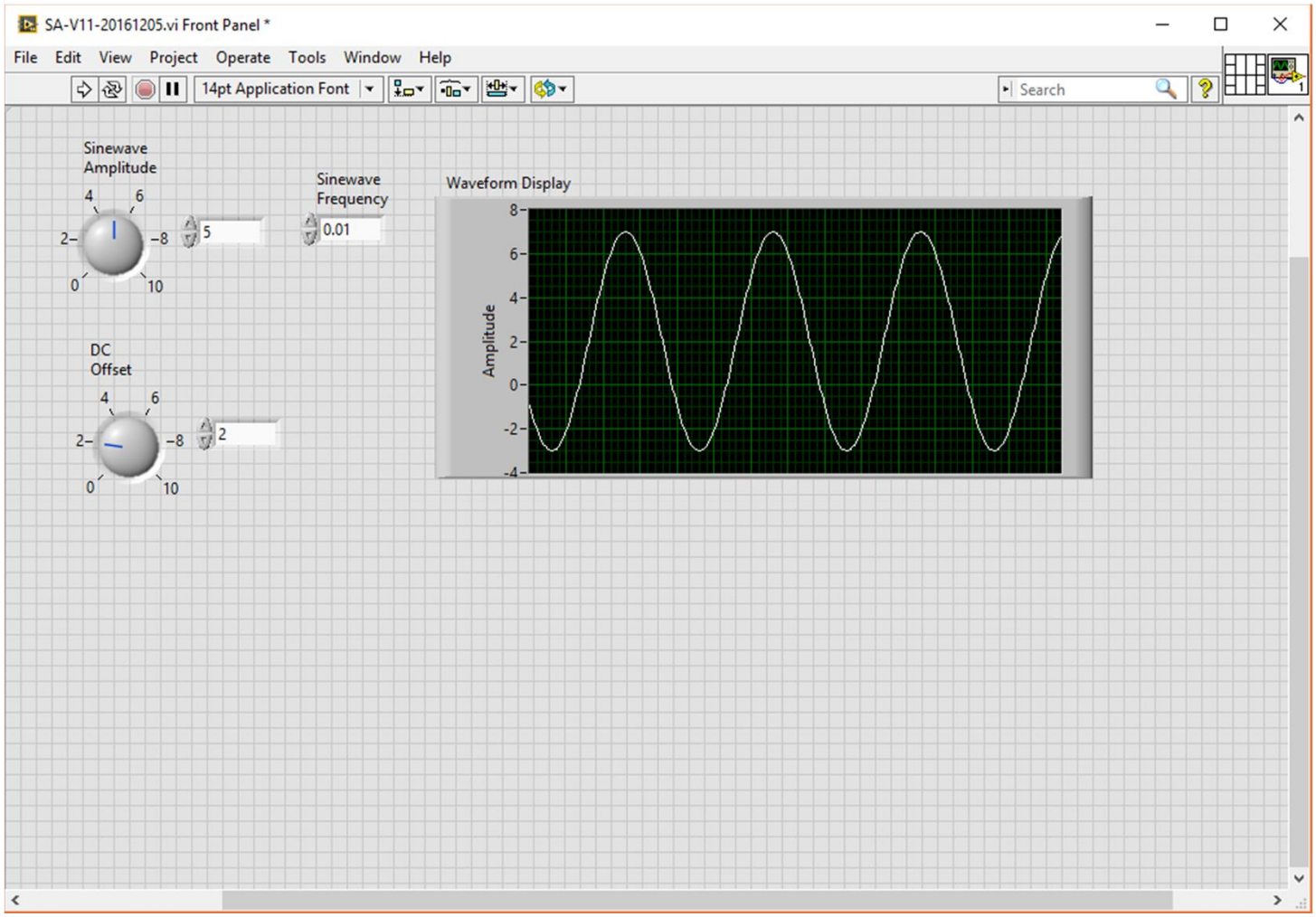
c)Place the cursor inside the digital indicator under the dial and type in a value, which will become effective when you click in a blank region on the front panel outside the indicator



- Each time the program is operated, all of the functions inside the for-loop structure are carried out 361 times with *i* starting at zero and incrementing by one after each iteration up through *i* = 360
- The value of *i* to represent angles in one-degree increments
- Division by 360 and multiplication by 2π converts these angles to radians
- The angles are then multiplied by frequency f
- The sine block computes the sine of each angle. Thus, each time the for loop is executed, a total of 361 points on f cycles of the sine function are calculated
- The amplitude input from the front panel multiplies the sinewave values, and the dc offset is added to each value

Each time the for-loop finishes, an array of 361 data points is passed to the display.

Each time you click the run button (not the run continuously button), *f* cycles of the signal will appear on the display



Adding the DC and RMS Virtual Instruments

Place and wire additional graphical-program elements to compute the average value of the data and the rms value of the ac component

Add front-panel displays

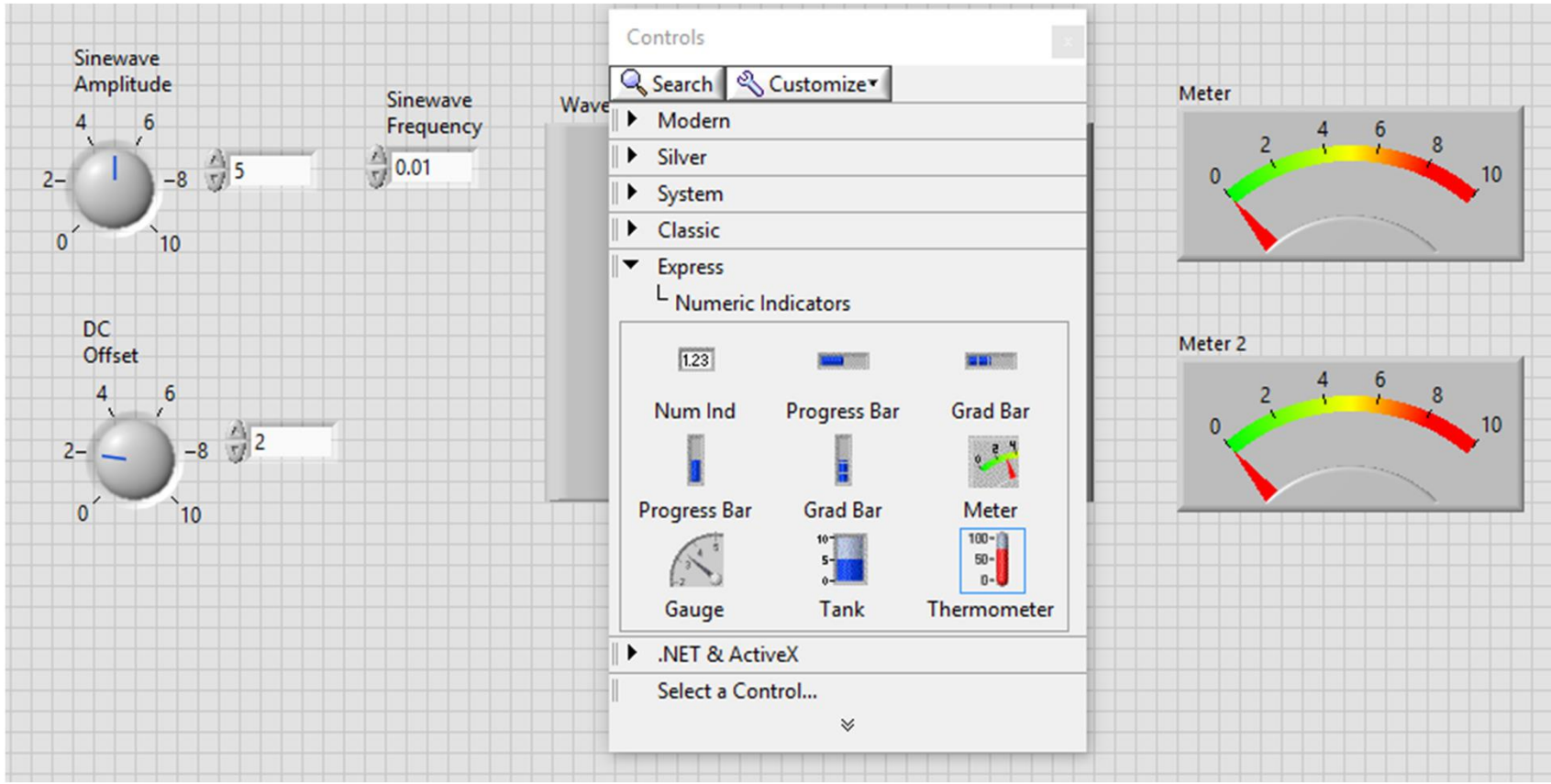
$$X_{\text{dc}} = \frac{1}{T}\int_0^T x(t)\,\mathrm{d}t$$

$$X_{\text{ac-rms}} = \sqrt{\frac{1}{T}\int_0^T \left(x(t) - X_{\text{dc}}\right)^2 \mathrm{d}t}$$

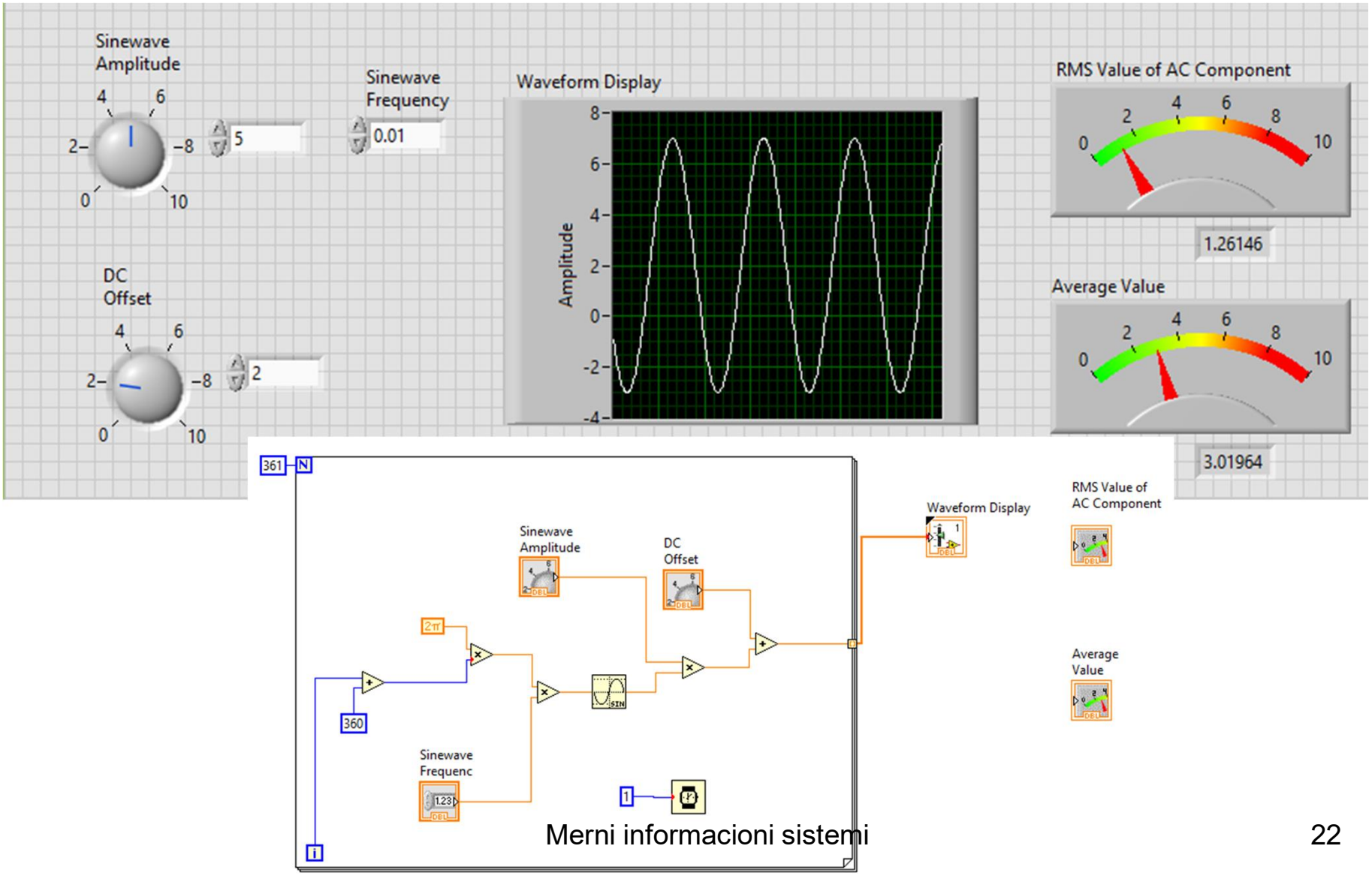
The front-panel meter icon, the Controls Palette and select Express>Numeric Indicators>Meter

Drop the meter icon on the front panel and label

Two meters are needed



Right-click on each meter and use the Visible Items>Digital Display command to add the digital display

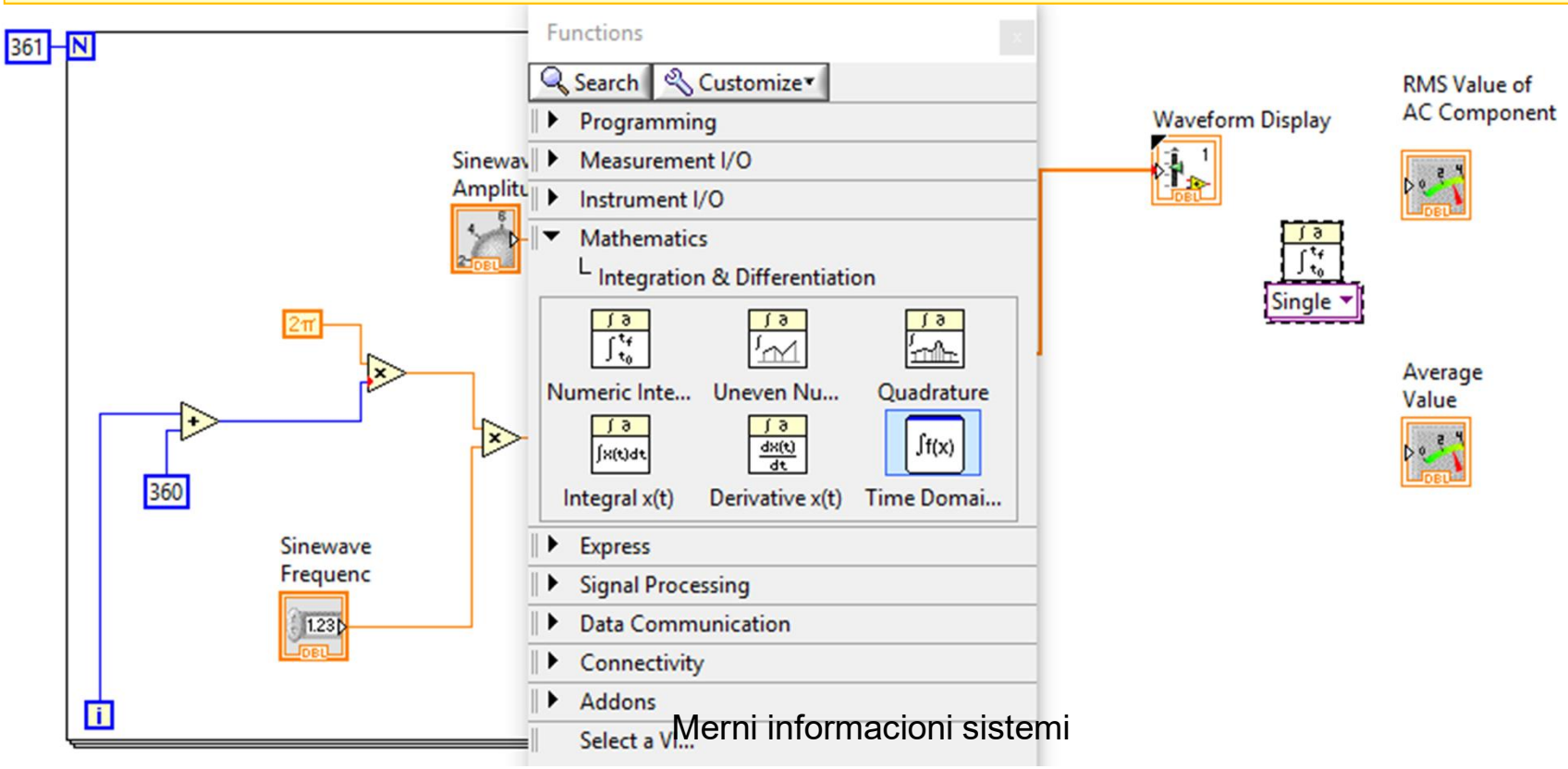


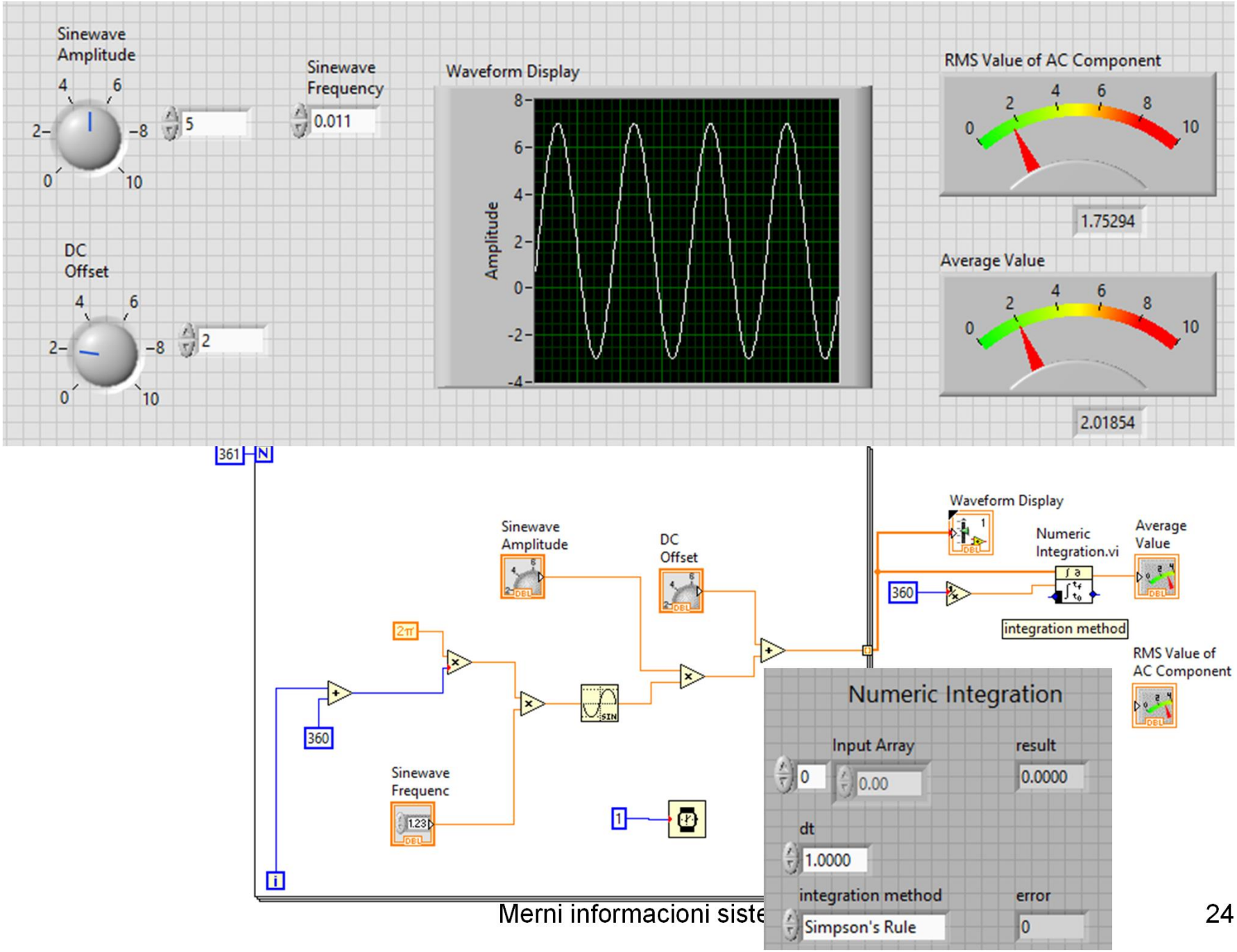
The signal needs to be integrated over one cycle (from t = 0 to t = T)

The result of the integration is then divided by the duration T

Conceptually, T=1, the time increment is 1/360

Integration block is on the functions menu by clicking on **Mathematics>Integration & Differentiation >Numeric Int.**




Sinewave Amplitude
5
Sinewave Frequency
0.011
DC Offset
2
Waveform Display
Amplitude
RMS Value of AC Component
1.75294
Average Value
2.01854
361
N
Sinewave Amplitude
DC Offset
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Average Value
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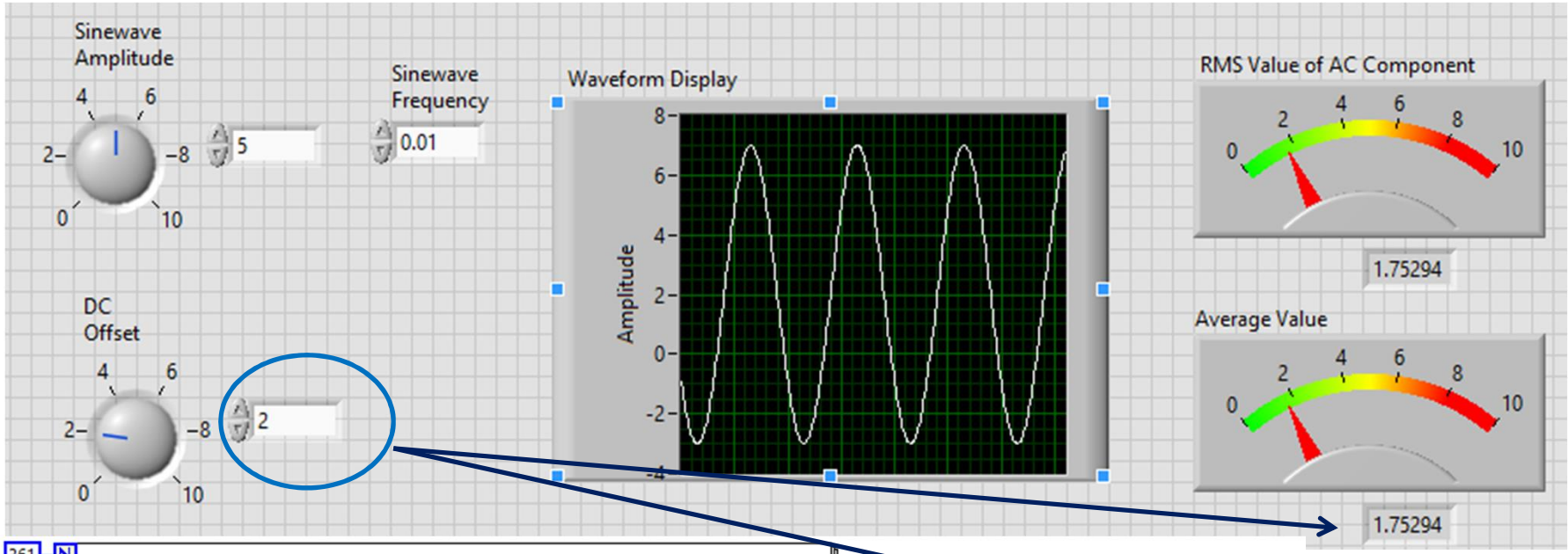
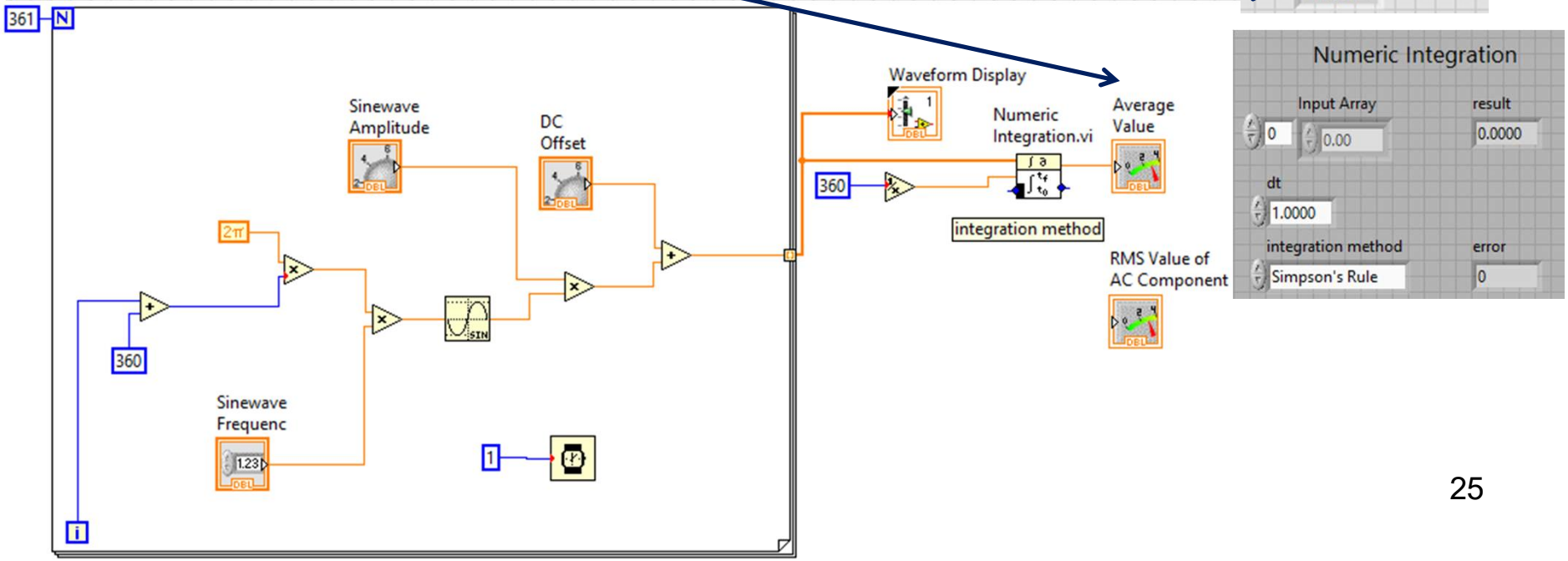
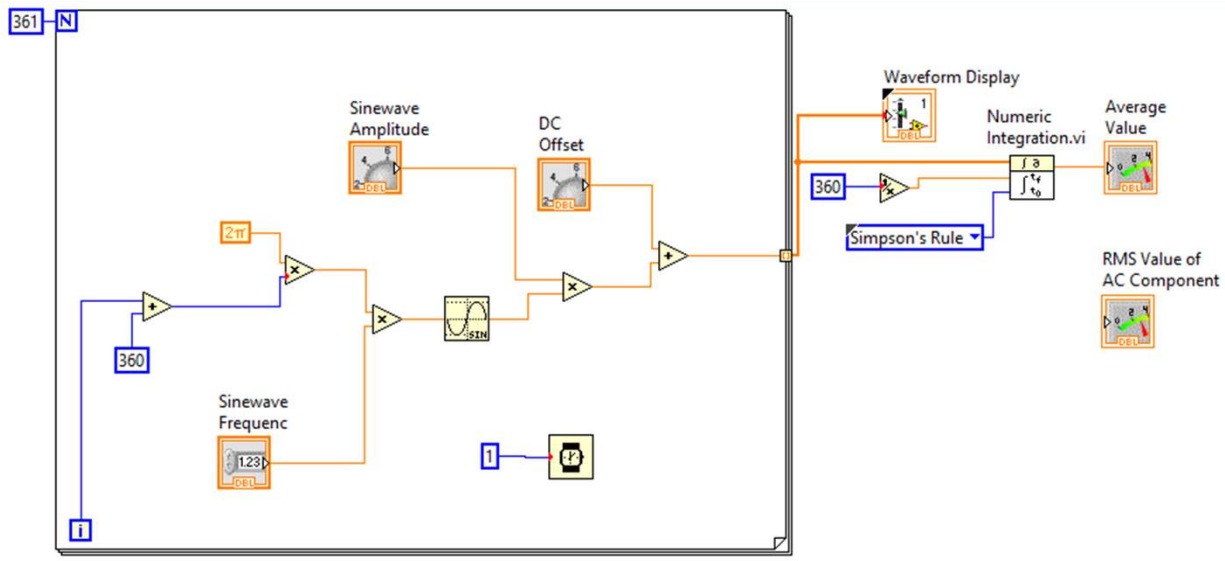
integration method
RMS Value of AC Component
Numeric Integration
Input Array
0
0.00
result
0.0000
dt
1.0000
integration method
Simpson's Rule
error
0

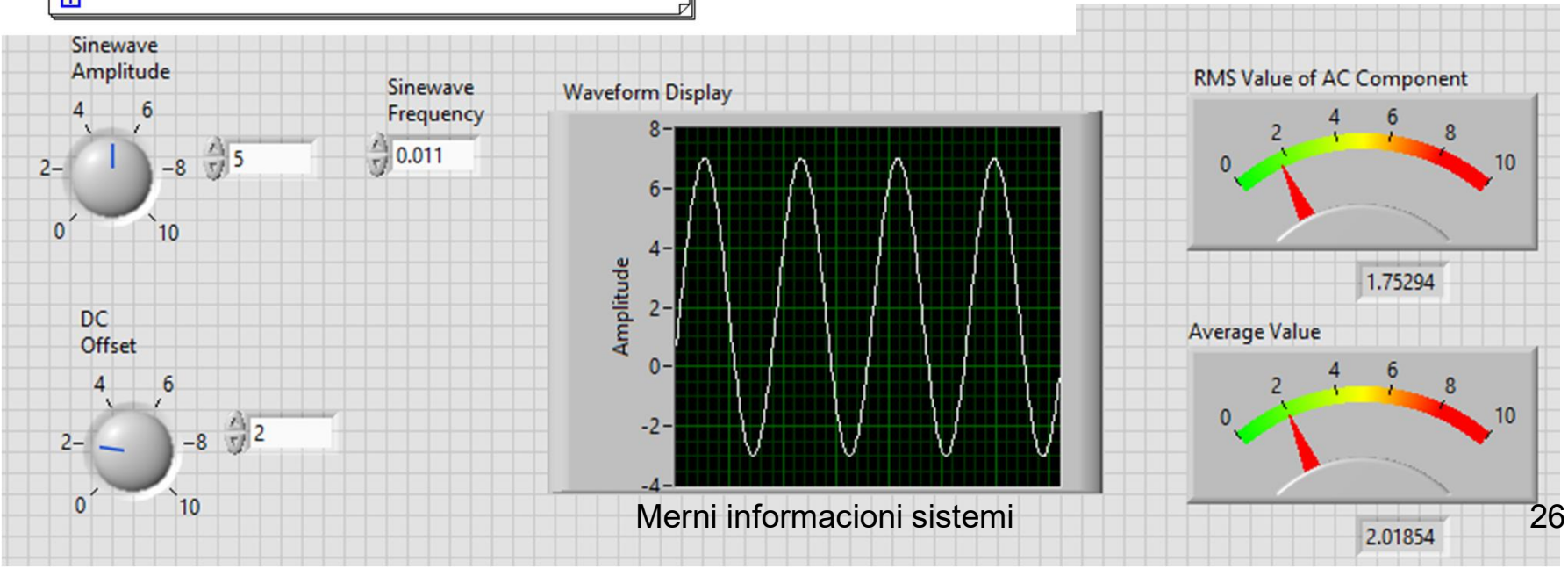
The integration block is a sub VI





The integration algorithm (right-click on the input and use the pop-up menu to select Create>Constant>Simpson's Rule





The RMS value of the AC component of the signal

The DC component is subtracted from the input array

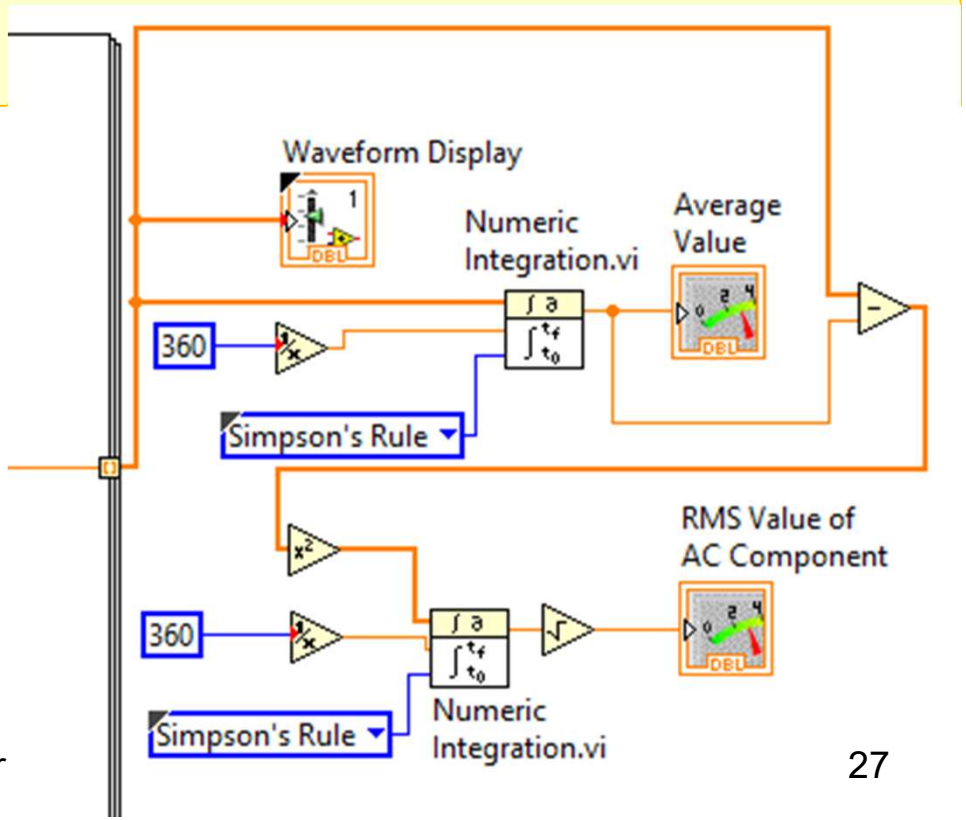
The result is then connected to both inputs of a multiplier

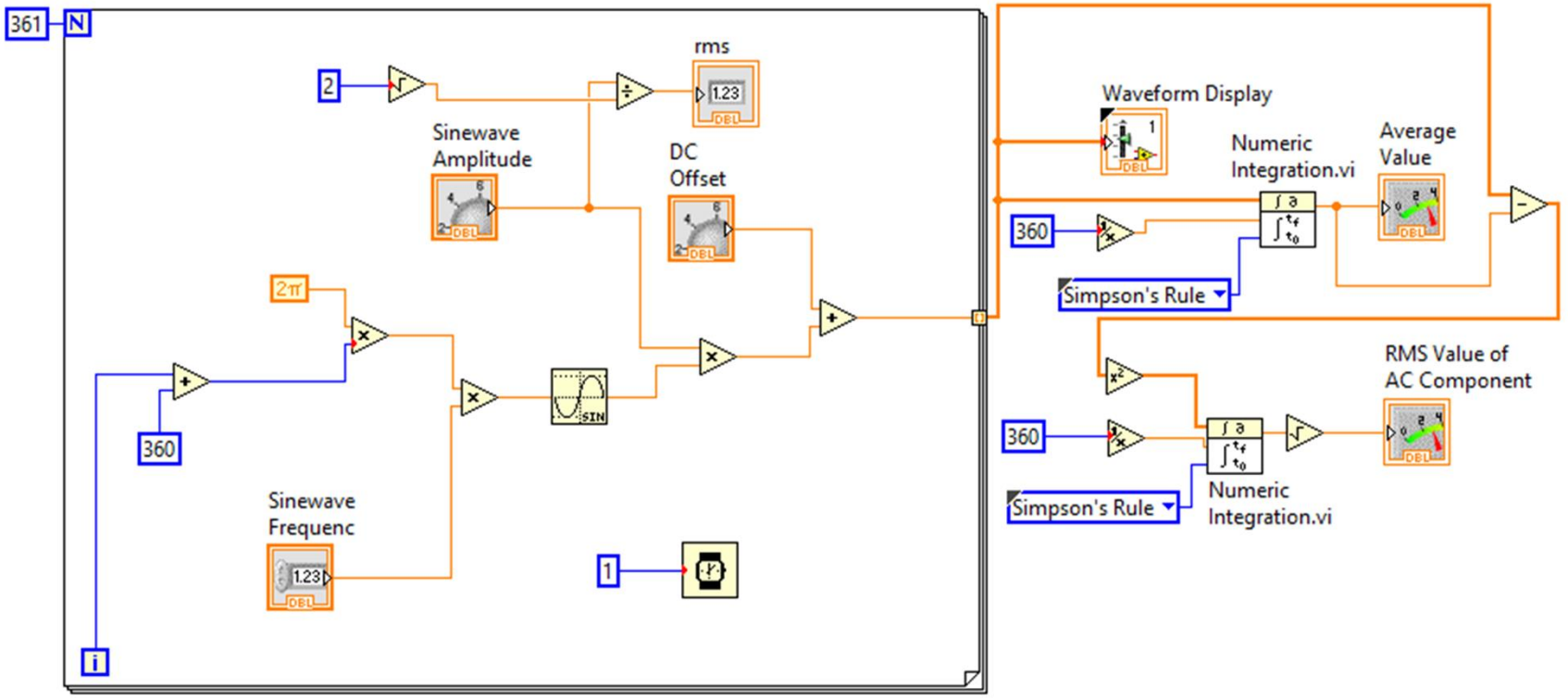
The corresponding elements of the arrays are multiplied

The squares of the values in the input array

This is integrated (T=1, Δt=1/360)

The square root is computed




361
N
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Average
Value
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Simpson's Rule
RMS Value of
AC Component
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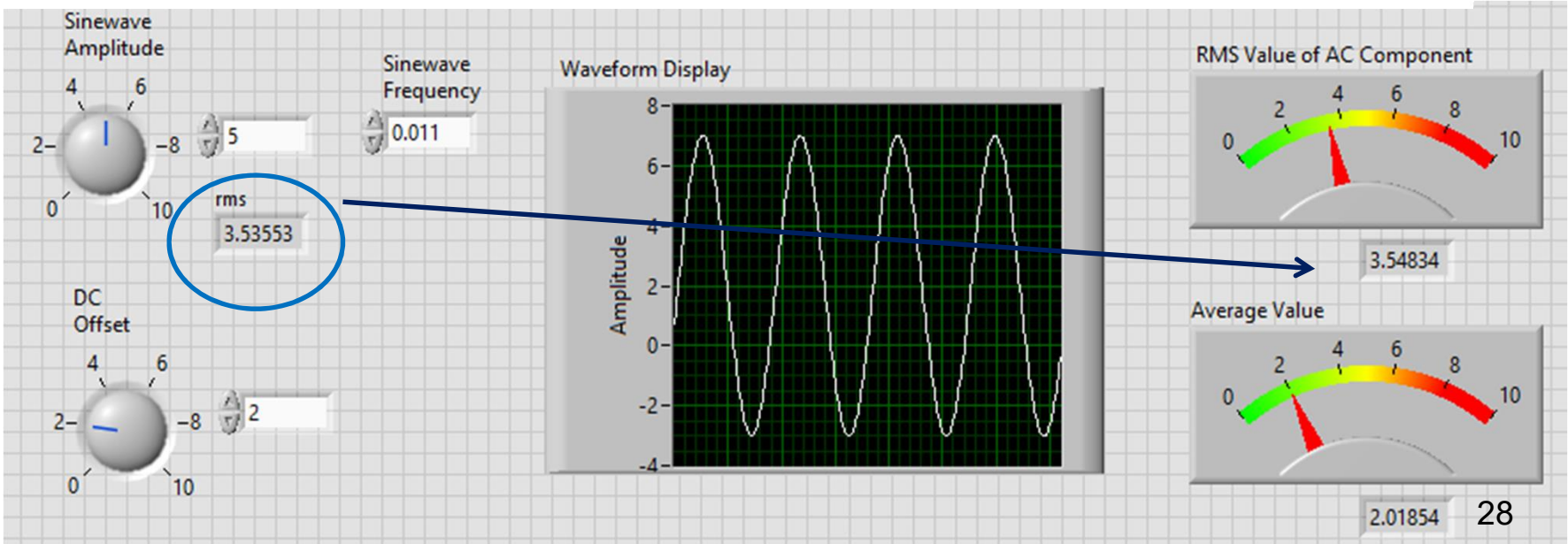
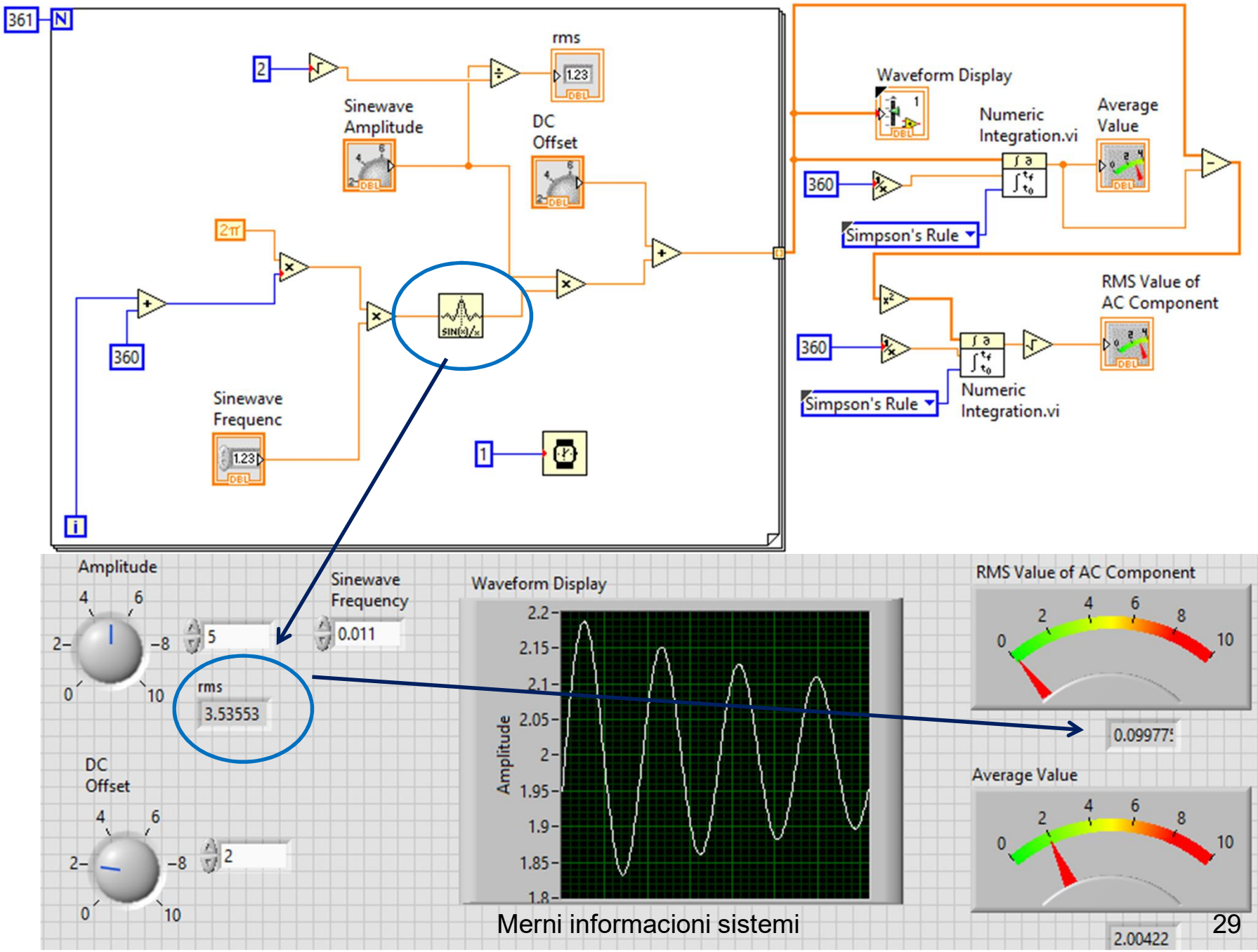
Simpson's Rule
Numeric
Integration.vi


Sinewave
Amplitude
5
Sinewave
Frequency
0.011
rms
3.53553
DC
Offset
2
Waveform Display
Amplitude
RMS Value of AC Component
3.54834
Average Value
2.01854


361
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Sinewave
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Waveform Display
Numeric
Integration.vi
Average
Value
360
Simpson's Rule
RMS Value of
AC Component
360
Simpson's Rule
Numeric
Integration.vi
Amplitude
5
Sinewave
Frequency
0.011
rms
3.53553
DC
Offset
2
Waveform Display
Amplitude
2.2
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
RMS Value of AC Component
0.09977
Average Value
2.00422

LabVIEW MathScript

Tools>MathScriptWindow

comments following the % signs

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Ova prezentacija je nekomercijalna.
Slajdovi mogu da sadrže materijale preuzete sa Interneta, stručne i naučne građe, koji su zaštićeni Zakonom o autorskim i srodnim pravima.
Ova prezentacija se može koristiti samo privremeno tokom usmenog izlaganja nastavnika u cilju informisanja i upućivanja studenata na dalji stručni, istraživački i naučni rad i u druge svrhe se ne sme koristiti –
Član 44 - Dozvoljeno je bez dozvole autora i bez plaćanja autorske naknade za nekomercijalne svrhe nastave:
(1) javno izvođenje ili predstavljanje objavljenih dela u obliku neposrednog poučavanja na nastavi;
- ZAKON O AUTORSKOM I SRODNIM PRAVIMA ("Sl. glasnik RS", br. 104/2009 i 99/2011)