Engin 103 April 24, 2008 back to e-syllabus	Topics: CW12 Project 3 Topic Assignment Logbook questions

Engineering 103 –UMass Boston

CW 12

(In-Class-Work 12)

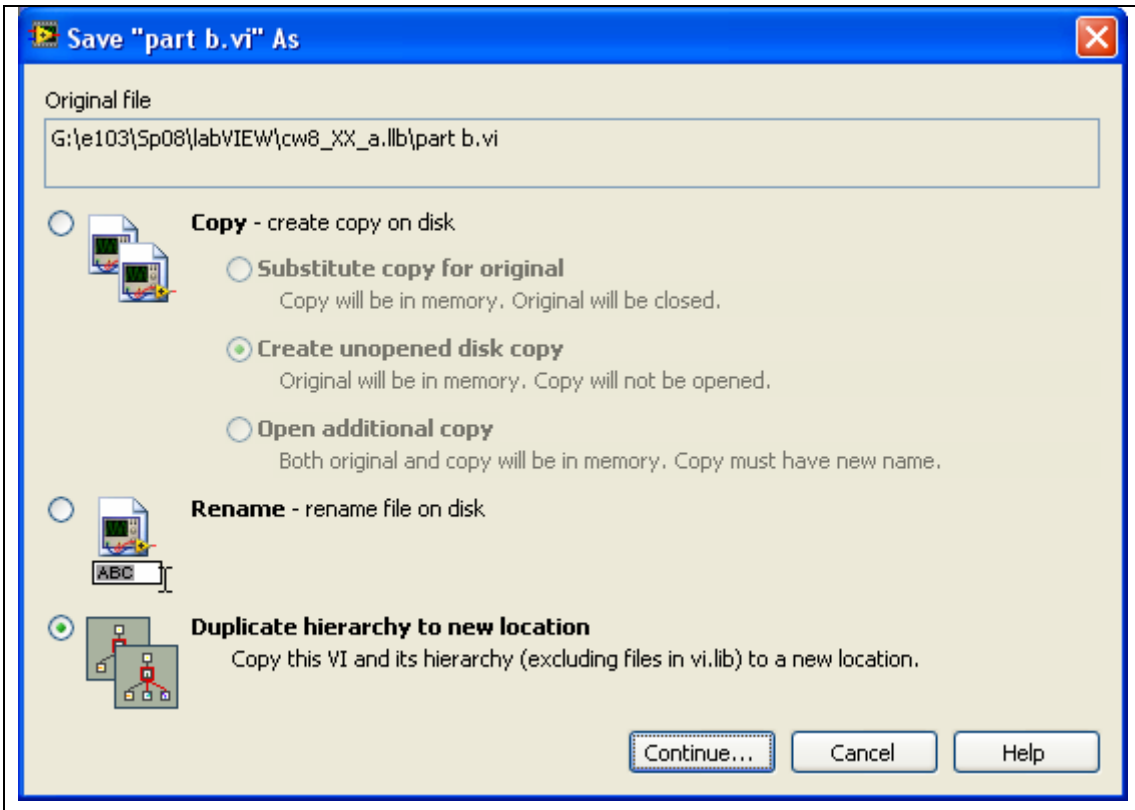
Plotting two sinusoids with arbitrary frequencies, their sum, and spectrum.

Starting with the LabVIEW Virtual Instrument (VI) to plot a function in CW8, create a modified VI that allows the user to change the frequency of the sinusoids within the Front Panel. Use one Waveform Graph for the two sinusoids, another for their sum, and a third one for their Spectrum. Use "FFT.vi" to compute the spectrum of the combined signal, then takes the absolute value to plot.

Please insert names and dates within the Front Panels. By alphabetical order of the last names, the first two students in each team will submit LabVIEW LLB file cw12_XX_a.llb, the next two students will submit LabVIEW LLB file cw12_XX_b.llb, to the *files* folder in the server. Each LLB file should contain two VI's corresponding to this CW. These files need to be uploaded to the server today to receive credit.

*Remember that this is an individual work (turn it in, as instructed, with your name and date). Home-works and class-works count 20% toward the course grade. Class-works are done in class.

Once you have opened the LLB file for CW8, to save it as a new LLB file for CW12, use Save As, then select Duplicate Hierarchy to New Location as shown below



Sinusoids:

Period T: time separation between consecutive peaks or troughs (time to complete one cycle)
Linear frequency f=1/T or number of cycles per second

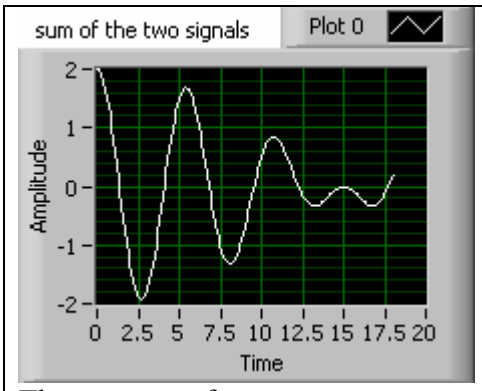
$$A\cos(\omega \cdot t) = A\cos\left(\frac{2\pi t}{T}\right)$$

A=Amplitude
ω= Angular frequency; ω=2πf=2π/T

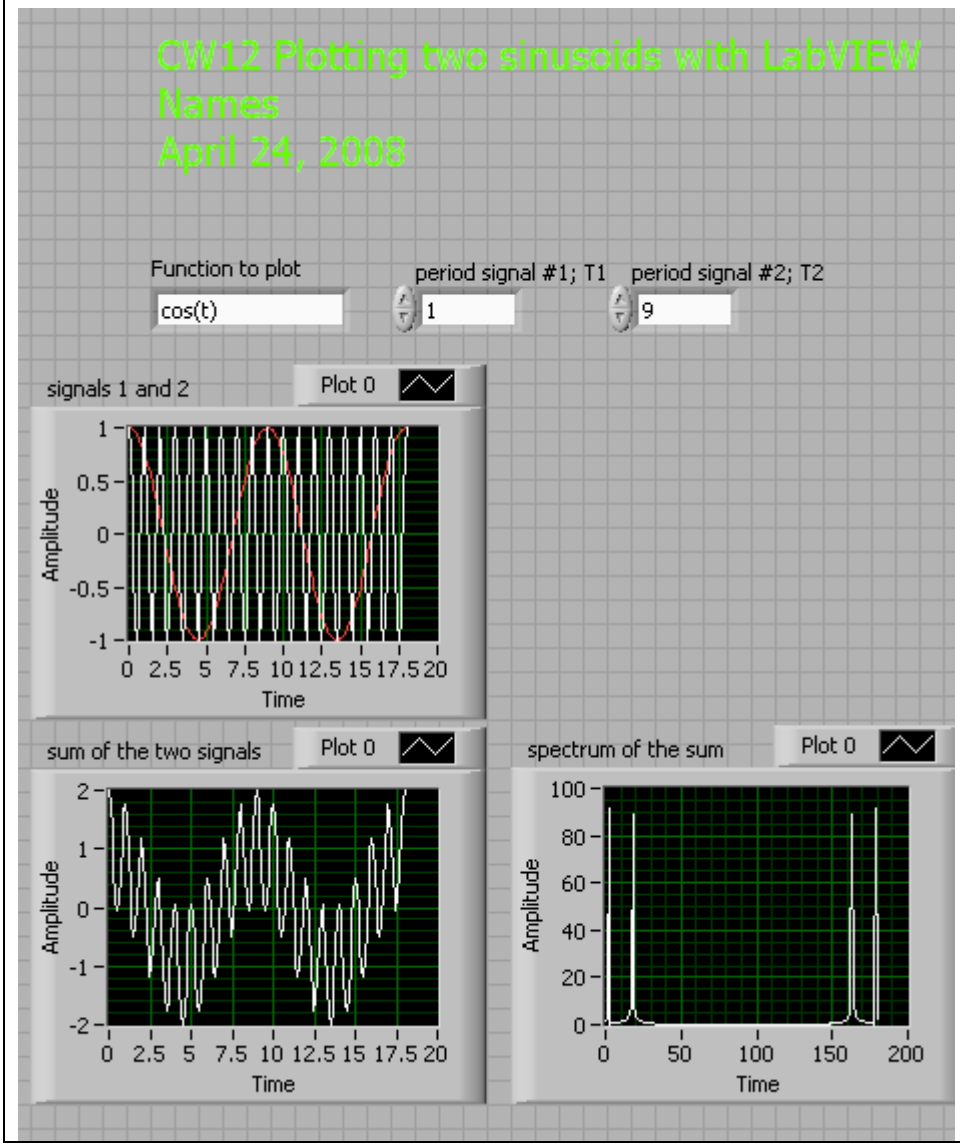
	$A\cos\left(\frac{2\pi t}{T}\right)$	cos(t) (Plotted in CW8)
Amplitude	A	1
Period	T	T=2π
Angular frequency	$\frac{2\pi}{T}$	1

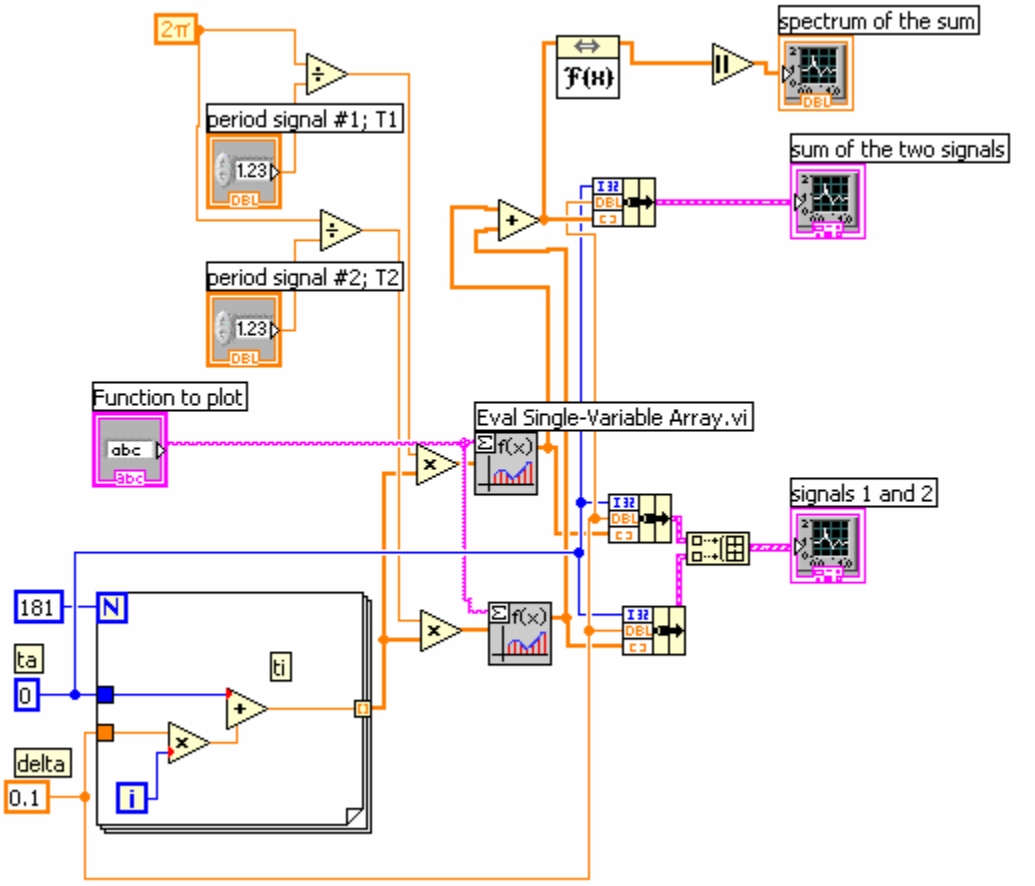
We will modify the VI for CW8 so the user can choose an angular frequency (or a period).

Spectrum: distribution of different frequency components of a signal



There are two frequency components in this signal, its spectrum will show two peaks





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Project 3

Project	Description	Team
A	Predict the max. temp. for the next day using previous days' temperatures, using polynomial and other models	8 (4/22 @8:51)
B	Predict the oil price for next week using previous weeks' prices, using polynomial and other models	6 (4/22 @9:56)
C	Detect the frequency spectrum of a given signal using Fourier Transforms	
D	Say the decimal number for a four-digit binary number	4 (4/22 @8:43)

E	Make a 8 keys piano	3 4/22 @8:53
F	Solve the quadratic equation with distinction of cases for the discriminant	1 (4/17 @9:47)
G	A VI that can calculate the areas of 4 different geometrical shapes	5 (3D) (4/17 @10:30) 7 (2D)
H	A VI that produces interesting sounds from the combination of 2 or more sine waves with different frequencies	10 (4/24)
I	A VI that produces a chirp sound, that is a sound whose frequency is changing with time	

Missing assignments: Teams 2 (please email me ASAP)

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LOGBOOK: example of a logbook page

-Use a quadrille notebook; number all pages; date all entries
-Write your notes for all activities, thoughts, problems and solutions, and learning conclusions related to Engin 103. You should write down progress, outcomes, and conclusions on projects and teamwork; conclusions from class work (including LabVIEW) and homework.
-In addition you should answer in the logbook all questions listed in these notes in blue, as shown below:

45) Explain the steps to modify CW8 so the frequency or period of a sinusoid can be controlled by the user.

46) Define the spectrum of a signal and explain how to show it in LabVIEW.

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