

Engin 103 November 20, 2008 <a href="#">back to e-syllabus</a>	Topics: <a href="#">CW12</a> <a href="#">Project 3 Topic Assignment</a> <a href="#">Logbook questions</a>
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## Engineering 103 –UMass Boston

### CW 12

### (In-Class-Work 12)

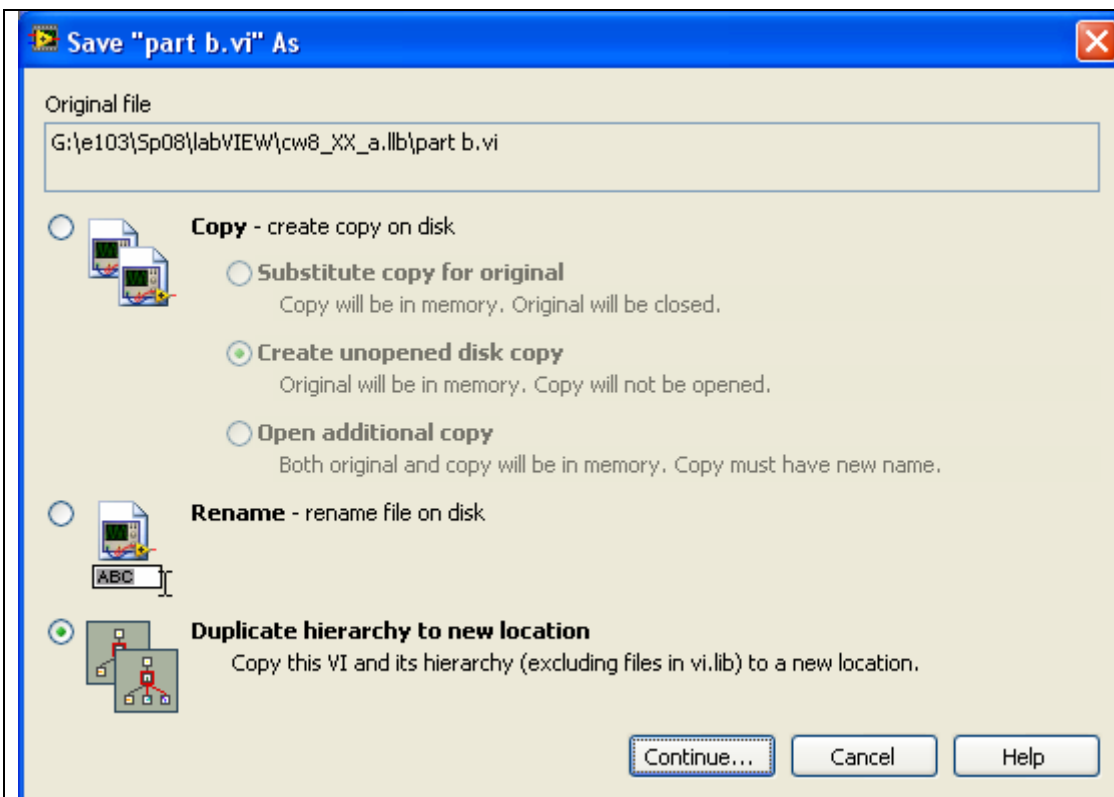
### Plotting two sinusoids with arbitrary frequencies, their sum, and spectrum.

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. In each team, students working together at a computer numbered between 1 and 10 will submit LabVIEW LLB file cw12\_XX\_a.llb, students working at a computer numbered between 11 and 20 will submit LabVIEW LLB file cw12\_XX\_b.llb, to the *files* folder in the server. Replace **XX** by 01 if team 1, etc. These files need to be uploaded to the server today to receive credit. **Include your names within the files.****

\*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

$\omega$ = Angular frequency;  $\omega=2\pi f=2\pi/T$

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

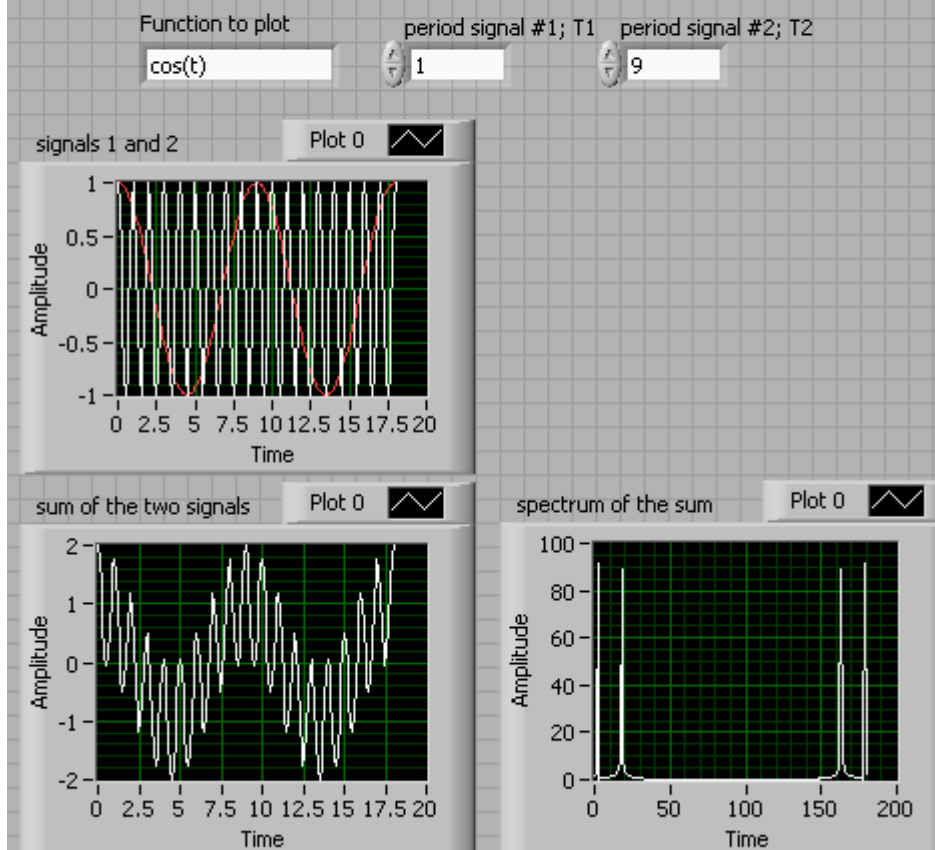
We will modify the VI for CW8 so the user can choose an angular frequency (or a period).

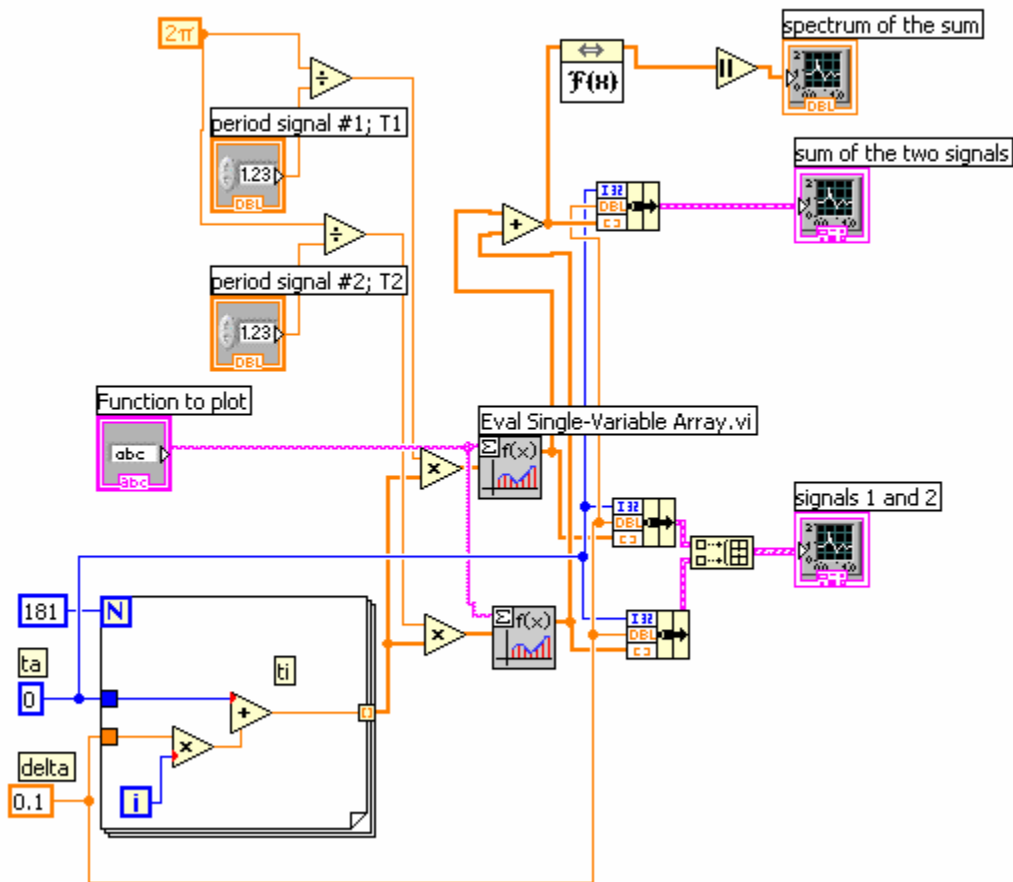
Spectrum: distribution of different frequency components of a signal



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

## CW12 Plotting two sinusoids with LabVIEW Names April 24, 2008





[back](#)

[back](#)

[back](#)

## Project 3

Project	Description	Team
A	Predict the max. temp. for the next day using previous days' temperatures, using polynomial and other models	5
B	Predict the oil price for next week using previous weeks' prices, using polynomial and other models	6
C	Detect the frequency spectrum of a given signal using Fourier Transforms	7
D	Say the decimal number for a four-digit binary number	3
E	Make a 8 keys piano	2

F	Solve the quadratic equation with distinction of cases for the discriminant	<b>10</b>
G	A VI that can calculate the areas and volumes of 5 different 3D geometrical shapes	<b>1</b>
H	A VI that produces interesting sounds from the combination of 2 or more sine waves with different frequencies	<b>8</b>
I	A VI that produces a chirp sound, that is a sound whose frequency is changing with time	<b>4</b>

[back](#)

### **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:**

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

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

[back](#)