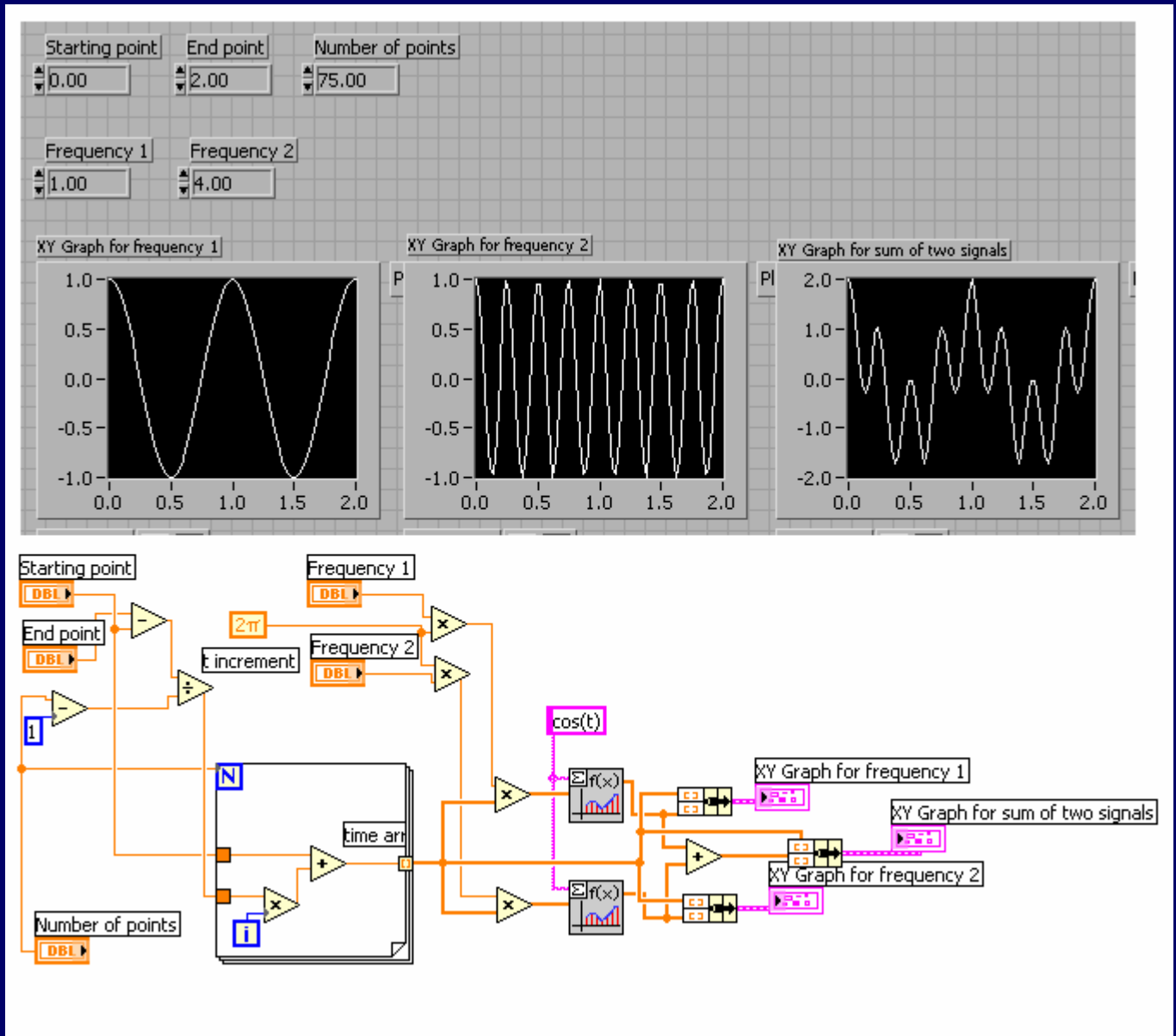
Meeting #24:
Link with tutorials on LabVIEW: www.iit.edu/~labview/Dummies.html (suggested by C. Jones)

How to plots a function using an XY graph? We introduced the For Loop and explained how computers plot a continuous signal. It actually plots points on an XY plane that consist of pairs of numbers. The first numbers in these pairs form a series, which I call the time series (more generally, the X-series, since in other CW, time is actually a Y variable). The second numbers in these pairs form the f(t) series (or the Y-series). To plot a function, we need to generate these pairs of numbers, then feed them into a LabVIEW utility called the XY Graph.

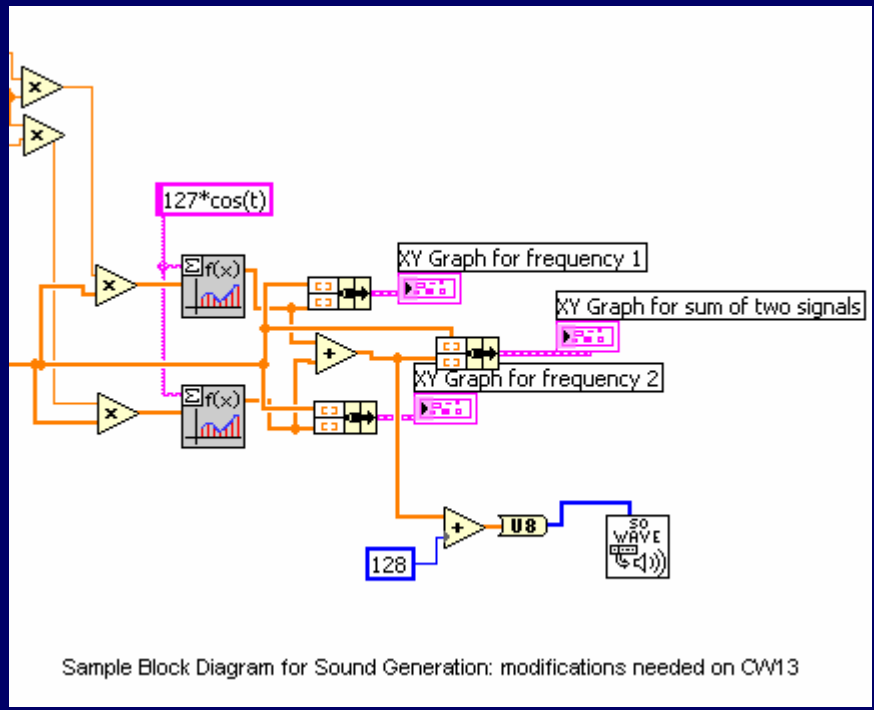
What is a time series for?
To plot a function between ta and tb using N points, the time series is given by
$t_i = t_a + i*\Delta$
where i runs from 0 to N-1; Δ is the increment ($\Delta=(t_b-t_a)/(N-1)$).
To check while this formula would generate a time series:
i=0 we get $t_0=t_a$
i=1 we get $t_1=t_a+\Delta$
i=2 we get $t_2=t_a+2*\Delta$
…
i=N-1 we get $t_{N-1}=t_a + (N-1)*(t_b-t_a)/(N-1)=t_b$
which makes sense!

This time series can be generated in LabVIEW with the For Loop (All functions/Structures) with N the number of points, and i the "iteration variable")
Then the f(t) series is obtained by evaluating f(ti); e.g. if f(t)=cos(t) then we need to evaluate cos(ti). This can be done in LabVIEW with a Eval Single Var. Array (All functions/Analyze/Mathematics/Formula/Advanced Formula Parsing) subVI.
The time series ti and the f(ti) series are then bundled together (Bundle, under All functions/Cluster) and fed into the XY Graph (under All functions/Graph)
Details were listed in the lecture notes. These fill-in conclusions are learning conclusions that need to be recorded in the logbook. In an active learning and discovery-based approach, elements are provided and you will connect them together in a way that makes sense.
Similar reflections can be made regarding the CW8 use of Case Structure: to perform different tasks based on a condition; and CW3-5 regarding data modeling: versus the role of Physics, the laws of science (look through the corresponding class notes).

Sound generation: CW13 (notice the implementation of cos(2πft) for different frequencies, see sample below) and use of *To Unsign Byte Integer (under All Functions/ Numeric/ Conversion), and Snd Write Waveform (under Graphics&Sound/ Sound).*



Sound Generation & Beat Phenomena: Use of *To Unsign Byte Integer (under All Functions/ Numeric/Conversion), and Snd Write Waveform (under Graphics&Sound/ Sound).*



Sample Block Diagram for Sound Generation: modifications needed on CVI13

Demonstration of the Beat Phenomena requires selecting the right number of points given an interval and frequencies (this is an trial-error approach to signal Processing that we can do at the introduction to engineering level).

Important learning conclusions expected in this course (complete list should be made from questions in bold in the posted lecture notes):

-Design cycle; design problems: anticipated problem; predictability; ergonimic
-Understand the utility of curve-fitting or data modeling
-How to conduct a brainstorming process
-How to do an estimation
-What is a Gantt chart
-Oral and written presentation techniques
-Internet search techniques
-How to build a web page and create links
-Teamwork and leadership rules and techniques

LabVIEW:
-Know how to use these programming elements as needed: Case Structure; For Loop; Formula Node; Eval Single Variable Array; Waveform Graph; XY Graphs; Array; Bundle; Build Array; String Control/Indicator; etc.
-Can pinpoint common error (broken wire error and some non-grammar error)