AMERICAN INTERNATIONAL UNIVERSITY- BANGLADESH

Laboratory Report

Report Title:	Introduction to MATLAB		
Lab Report No:	01	**Date of Submission:**	08-06-2022
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Course Code:	COE3103	**Course Title:**	Data Communication
Course Instructor:	Afsah Sharmin	**Section:**	B

Problem:

Performance Task for Lab Report: (your ID = AB-CDEFG-H)

**Generate two CDEF hertz sinusoids with different amplitudes and phases.

$x_1(t) = A_1 \cos(2\pi(\text{CDEF})t + j_1)$ $x_2(t) = A_2 \cos(2\pi(\text{CDEF})t + j_2)$

(a) Select the value of the amplitudes as follows: let A_1 = AB and A_2 = GH. For the phases, use j_1 = DG (in degrees), and take $j_2 = 30^o$. *When doing computations in* Matlab, *make sure to convert degrees to radians.*

(b) Make a plot of both signals over a range of t that will exhibit approximately 3 cycles. Make sure the plot starts at a negative time so that it will include $t = 0$, *and make sure that you have at least 20 samples per period of the wave.*

(c) Verify that the phase of the two signals $x_1(t)$ and $x_2(t)$ is correct at $t = 0$, and also verify that each one has the correct maximum amplitude.

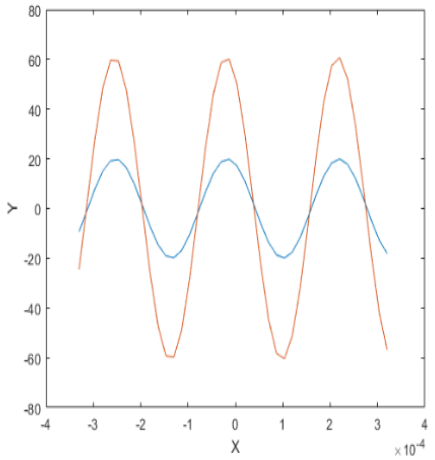
(d) Use subplot(3,1,1) and subplot(3,1,2) to make a three-panel subplot that puts both of these plots on the same window. See help subplot.

(e) Create a third sinusoid as the sum: $x_3(t) = x_1(t) + x_2(t)$. In Matlab this amounts to summing the vectors that hold the samples of each sinusoid. Make a plot of $x_3(t)$ over the same range of time as used in the previous two plots. Include this as the third panel in the window by using subplot (3,1,3).

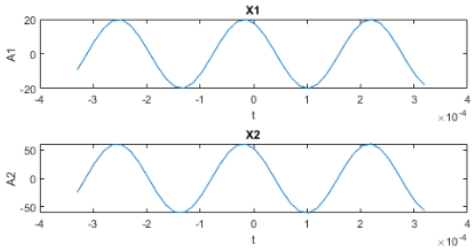
Solution:

	MATLAB Code	Output

a	`%AB-CDEFG-H`
	`%20-42406-1`
	`%A1=AB;A2=GH;j1=DG`
	`A1=20`
	`A2=61`
	`CDEF=4240`
	`j1=26*(pi/180) %converting degree to radian`
	`j2=30*(pi/180) %converting degree to radian`
		`A1 = 20`
		`A2 = 61`
		`CDEF = 4240`
		`j1 = 0.4538`
		`j2 = 0.5236`

b	`fs=60000;`
	`dur=0.00033`
	`t=-dur:1/fs:dur;`
	`x1=A1*cos((2*pi*CDEF*t)+j1);`
	`x2=A2*cos((2*pi*CDEF*t)+j2);`
	`plot(t,x1,t,x2)`
	`xlabel('X');`
	`ylabel('Y');`
		`dur = 3.3000e-04`
		 

c	$X_1(t)$ leads $X_2(t)$; $X_2(t)$ reaches peak value after t=0 while $X_1(t)$ reaches peak value before t=0 $X_1(t)$ reaches peak value A_1=19.98 at t=0.018 $X_2(t)$ reaches peak value A_2=61.01 at t=0.01	

d	`subplot(3,1,1)`
	`plot(t,x1);`
	`title('X1'); % A1*cos((2*pi*CDEF*t)+j1);`
	`xlabel('t');`
	`ylabel('A1');`
	`subplot(3,1,2)`
	`plot(t,x2);`
	`title('X2'); % A2*cos((2*pi*CDEF*t)+j2);`
	`xlabel('t');`
	`ylabel('A2');`
		

e	`subplot(3,1,1)`
	`plot(t,x1);`
	`title('X1'); % A1*cos((2*pi*CDEF*t)+j1);`
	`xlabel('t');`
	`ylabel('A1');`
	`subplot(3,1,2)`
	`plot(t,x2);`
	`title('X2'); % A2*cos((2*pi*CDEF*t)+j2);`
	`xlabel('t');`
	`ylabel('A2');`
	`x3=x1+x2 %3rd sinusoid`
	`subplot(3,1,3)`
	`plot(t,x3);`
	`title('X3'); % x3=x1+x2 ;`
	`xlabel('t');`
	`ylabel('A3');`
		`x3 = 1×40`
		`-33.8311  1.0466  35.7212  63.4685  78.9075  79.0439 ...`