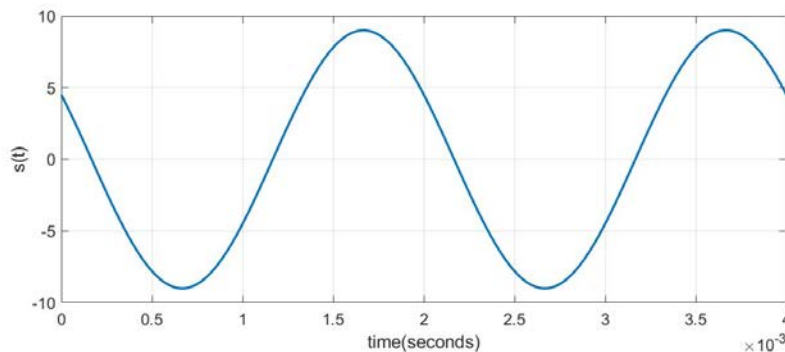<div align="center">

HOMEWORK ASSIGNMENT #1

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Assigned: August 18, 2020
Due: August 28, 2019

1. Identifying Properties of a Sinusoid: The plot below shows a sinusoidal function of the type

$$s(t) = A\cos(\omega_0 t + \phi)$$

a) Use the plot to find the values of A, ω_0, ϕ
b) Write $s(t)$ as an equivalent sine (not cosine) function
c) Check your answer to part (a) and (b) by plotting the functions in MATLAB and making sure that they are the same as the plot above. <u>Make the curves in your plot red instead of blue.</u> Be sure to submit your figure and your code.

2. Sinusoid Plots and Conversions: Consider
$$x(t) = 2\cos(\omega t + 5) + 8\cos(\omega t + 9) + 4\cos(\omega t)$$
where the phases have units of radians.

a) Express $x(t)$ in the form $x(t) = A\cos(\omega t + \phi)$

b) For $\omega = 2\pi(30)$ use MATLAB to make a plot of $x(t)$ in both forms and show that the graphs are identical. Plot two periods of both signals and use the `subplot` command to two plots on the same figure. Be sure to label all axes and submit your figure and your code.

3. Phase of a Sinusoid: The phase of a sinusoid can be related to a time shift as follows:

$$x(t) = A\cos(2\pi f_0 t + \phi) = A\cos(2\pi f_0 (t - t_1))$$

Assume that the period T_0 of the sinusoidal wave is 8 s.

a) Find the value of ϕ when $t_1 = -2$ sec
b) Find the value of ϕ when $t_1 = 3$ sec
c) Find the value of ϕ when $t_1 = 7$ sec

4. Phasor Notation: Two sinusoidal signals are defined as

$x_1(t) = \sqrt{5}\cos(7t - \pi/3)$ $x_2(t) = \sqrt{5}\cos(7t + \pi)$ and their sum is denoted as $x(t) = x_1(t) + x_2(t)$

a) Find the complex valued signal $z_1(t)$ such that $x_1(t) = \Re\{z_1(t)\}$

b) Find the complex valued signal $z_2(t)$ such that $x_2(t) = \Re\{z_2(t)\}$

c) Find the complex valued signal $z(t)$ such that $x(t) = \Re\{z(t)\}$