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%a. load the data .mat file into Matlab
% clearing & closing before each run
clc
clear
close all
load ("ENGR131_21F_032_02.mat")

%%
%b. create a function CalcPosition at the bottom of your script.
%This function should return the output argument Height and receive the input
arguments
%Time and Damping.
%The values of a and ω should be set as variables and can be assigned within this
function.
%Compute Height based on eq. 1


% c. prompt the user to create a damping coefficient
damping = input('Enter damping coefficient: ');
% d. Respond to the user input and repeat the value they entered back to them to
%    two decimal places
fprintf('Damping coefficient is %.2f\n',damping);
% create a time vector t, that ranges from 0 to 50 and contains 50 evenly
% spaced values
% e. Use a selection statement to determine if the value entered is greater than
zero.

if damping > 0


    % e.1 Create a Time vector that ranges from 0 to 5 and contains 75 evenly
spaced values
    t = linspace(0,5,75);
    % e.2 Compute the Height of the system by calling your CalcPosition function
    % and passing the Time and Damping arguments to it (5 pts).
    h = CalcPosition(t, damping);
    % e.3 Find the minimum height of the system and it's index
    [minHeight, indexMinHeight] = min(h);
    % e.4 Plot the Height of the system over time using a red line with triangle
markers
    figure
    plot(t,h,'r-^');
    % % e.5 plot the minimum height using a blue circle
    hold on; % allows to plot on top of previous plot (instead of erasing previous
plot)
    %figure %<- will create a whole new window of the same graph with the plot &
code below
    plot(t(indexMinHeight),minHeight, 'bo');
    % hold off; % if I plot something else, this will delete
    % e.6 Add appropriate labels and a title
    xlabel('Time (s)');
    ylabel('Height (m)');
    title('Lab 02: Height as a function of Time');
    % e.7 Set the Height limits of the plot to -1 to 1
    ylim([-1,1]);

    % If the value entered by the user is zero or less,
    % call the function ENGR131_21S_031_02 (located in the .m file you downloaded),
    % passing the input arguments Warning and Fs
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    % (loaded into Matlab when you loaded the .mat file) to it.

else
    ENGR131_21F_031_02(Warning, Fs)

end

%(b) creating function CalcPosition at bottom of script
function Height = CalcPosition(Time, Damping)
% Matlab function CalcPosition to calculate the Height of the
% based on the inputs time and damping coefficient

% defining variables for values of a and w
a = 1;
w = 8;
% calculate height
Height = exp(-Damping.*Time).*a.*cos(w.*Time);
end
```