

The objective of this homework is to test your understanding of the content of Module 4 and Lab-1. Due date of the homework is: **Thursday, October 1st, 2020**. You have to upload a scanned version of your solutions on Blackboard. If you don't have a scanner around you, you can use Cam Scanner—a mobile app that scans images in a neat way, as if they're scanned through a copier.

For questions related to the homework, please email the two teaching assistants: (a) Wasim (email: wasim.dipon@my.utsa.edu) and (b) Yuvaraj (email: yuvaraj.munian@my.utsa.edu).

You can send your question to both of them on the same email. Feel free to CC me as well, but that is not necessary.

1. Consider your MATLAB knowledge termed $K(t)$ over days is defined by the following equation with a learning time constant (τ) of 1.5 days.

$$K = 1 + e^{\frac{t}{\tau}}$$

Plot the function K with respect to days and mention how well you will know MATLAB at the end of 10 days by estimating the value of K at $t = 10$ days. Label the X-axis (days) and Y-axis (K) and name the title of the plot as "MATLAB Knowledge improvement". **(30 points)**

2. You are given a row vector $a = [1, 2, 3, 5]$, write a MATLAB program to calculate the average and the range of the elements of the given row vector. The range of the elements means the difference in the highest and lowest elements in the vector.

[Hint: This function has 2 outputs (average and range) and 1 input (a). The built in functions for calculating the average and range are 'mean (a, 'all')' and $\text{range} = [\max(a) - \min(a)]$. The mean (a, 'all') function calculates the mean of all the elements of the vector]. **(30 points)**

3. Write a MATLAB program which can take a word entered from the user and can detect if the word is a palindrome or not using if else statement.

[Hint: Palindrome is a word that reads the same backward as forward. Example: MOM, WOW, CIVIC. Use the concept of entering user input as string and also use the concept of reverse function to reverse the string. Then using if else statement determine if the reverse is as same as the actual word entered. If true it is palindrome and if not, it is not a palindrome]. **(20 points)**

4. Write a function with the following declaration: `function plotSin(f)`
In the function plot a sine wave with frequency 'f', $\sin(f * x)$ in the interval $x=0:0.001:2*\pi$. Label the x-axis and y-axis of the plot as 'Radian' and 'Amplitude' respectively. Write a main program that takes a frequency value (f) from the user and plot the sine wave of that frequency

calling the plotSin function. Try the program using values of 'f' as 5 and 10 to view the difference in the plots. Display the plots and save them. Include the plots with your answer in the word file.
(20 points)