

ECE 103 Lab 1 Report

Problem 1:

In this problem we were tasked at creating a vector of numbers from 1 through 100, and creating a second vector that includes every even number from the first vector.

1. Defined vector x = 1-100 and vector y = empty
2. For loop through vector x
3. If statement if mod of current x value and 2 is equal to 0, append to y vector

y =

Columns 1 through 16

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

Columns 17 through 32

34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

Columns 33 through 48

66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96

Columns 49 through 50

98 100

Problem 2:

In this problem we were tasked at calculating the value of $x(t) = 3\cos(2\pi ft + 0.1)$ for values of $t = 0, 0.1, 0.2, 0.3, 0.4$ and $f = 10, 15, 20$.

1. Defined vector t and f with values above
2. Defined empty matrix x with dimensions of vector t and f
3. Nested for loop cycling through t and f plugging them into function defined above and inserting into matrix x

x =

2.9850	2.9850	2.9850	2.9850	2.9850
2.9850	-2.9850	2.9850	-2.9850	2.9850
2.9850	2.9850	2.9850	2.9850	2.9850

Problem 3:

In this problem we want to find the largest value of t for which $e^{1.2}\cos(wt)$ and t^3 are less than 10, for $w=35, 40, 45$.

1. Define vector omega with 35, 40, 45 and vector t with 0, 0, 0
2. For loop through omega vector

3. Nested while loop testing whether t and omega plugged in from vectors cause functions to be below 10, if yes, add 0.01 to the specific t, and rerun the while loop
4. Once t has been found where condition is not fulfilled, move to next omega from vector via for loop.

t =

2.1600 2.1600 2.1600

Problem 4:

In this problem we are asked to create a vector of values from the function

$x(t) = \cos(2\pi t + 0.2) + 3\sin(\pi^2 t)$ with 15 equally spaced t-inputs from 0 to 1, and find the max value, the min value, the mean of the vector, and the indices of the values that are greater than 4.

1. Defined an empty vector, and define a value interval as 1/15
2. Starting at t=0, for loop 15 times plugging in t into the function defined above, appending result into the vector, and adding the interval to t at every loop
3. Use max function to find max of the vector
4. Use the min function to find the min of the vector
5. Use the mean function to find the mean of the vector
6. Use find function to find the indices of all of the values in the vector that are greater than 4

vector_4 =

Columns 1 through 9

3.9203 5.0927 4.9357 3.2152 0.2636 -3.0915 -5.8037 -6.9828 -6.2248

Columns 10 through 15

-3.7653 -0.3953 2.8287 4.9646 5.5089 4.5392

Max:

5.5089

Min:

-6.9828

Average:

0.6004

Items larger than 4:

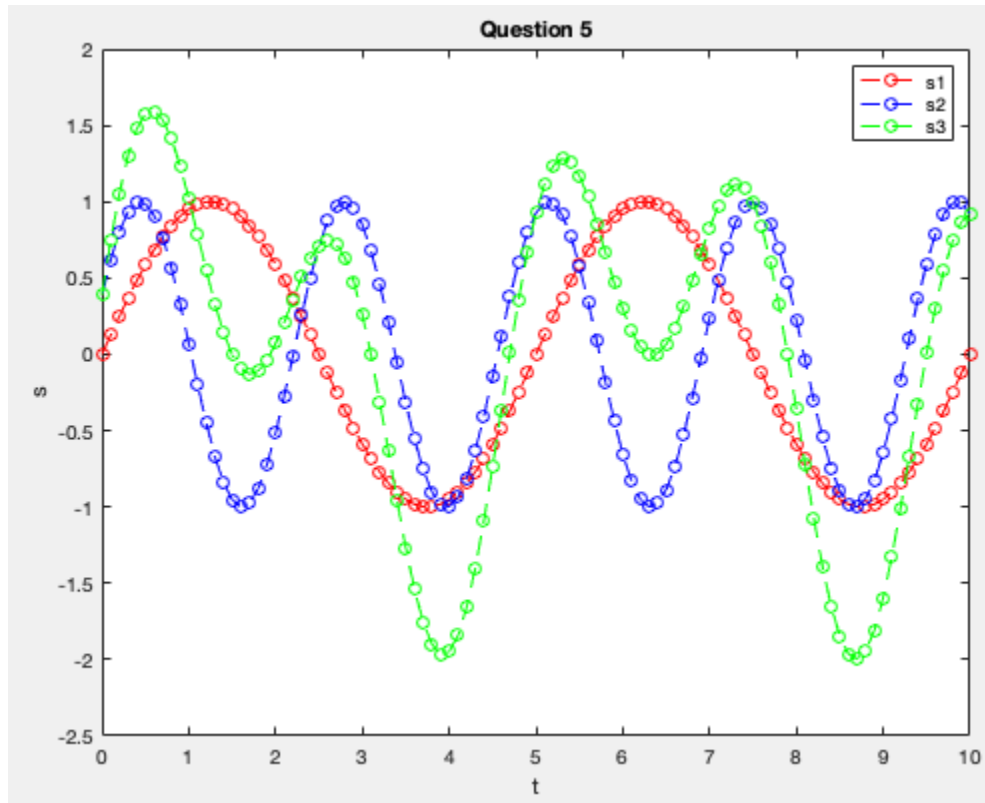
2 3 13 14 15

Problem 5:

In this problem, we were tasked with plotting the functions:

$s_1 = \sin(2\pi f_1 t)$, $s_2 = \sin(2\pi f_2 t + 0.4)$, and $s_3 = s_1 + s_2$ where $f_1 = 0.2$, $f_2 = 0.425$ on an interval of $t = 0:0.1:10$.

1. Create a vector t with the interval defined above and define s_1 , s_2 , and s_3
2. Plot s_1 , s_2 , and s_3 against t using the plot function and the hold on function
3. Add a title, legend, axis labels, and plot colors for the different functions

**Problem 6:**

In this problem, we created our own function named MySinc, which approximates the sinc function in matlab.

1. Create a new .m file which defines the function MySinc
2. Checks if input is equal to 0, if it is, set output to 1, else set the output to $\sin(\text{input})/\text{input}$
3. In another file, define a linspace from -2π to 2π , and use the function arrayfun with MySinc and sinc inputting the linspace, equaling it to two vectors y_1 and y_2
4. Plot y_1 and y_2 against the range -2π to 2π , with legend, title, axis labels, and plot colors.

