

Introduction To MATLAB

IMPORTANT NOTES :

- Name your file (and your function) as mentioned.
- Be aware of input/output format. Your code will be graded via an automated MATLAB judge according to the number of the tests you have passed.
- Do not display your answers by removing the semicolon at the end of your line. Using the functions `disp` or `fprintf` is recommended instead.
- Do not print any additional comments or variables in your output. You are only expected to display what you have been asked to.

Generating Variables, Common Functions and Indexing

Write a MATLAB script which generates the following variables and displays them as outputs:

- Define $X = 0.6$ and $X = 2.5416$ Generate Z a vector containing $\sin(X)$ and $\cos(Y)$. calculate A the sum of all square values of Z.
- Generate a vector B with the first 20 fibonacci numbers. $([0 \ 1 \ 1 \ 2 \ 3 \ 5 \ . \ . \ . \])$. (B is a vector with 20 elements.)
- Generate vector $C = [4 \ 3.9 \ . \ . \ . \ 0 \ . \ . \ . \ 3.9 \ 4]$. (All the numbers from 4 to -4 decreased by 0.1).
- Make a 5 5 matrix D with the form below:

$$\begin{bmatrix} 2 & 4 & \dots & 32 \\ 4 & 8 & \ddots & 64 \\ \vdots & \vdots & \ddots & \vdots \\ 32 & 64 & \dots & 512 \end{bmatrix}$$

- Use the values which are in both odd rows and columns of the matrix above to form a new matrix E which should be a 3 3 matrix.
- Make a 9 9 matrix of all 1s and add it to another 9 9 matrix of all zeros but with the values of $[1 \ 2 \ 3 \ 5 \ 7 \ 11 \ 13 \ 17 \ 19]$ on the main diagonal. the final answer is the matrix F

which you should display (Use zeros, diag)

$$\begin{bmatrix} 2 & 1 & \dots & 1 & 1 \\ 1 & \ddots & 1 & \ddots & \vdots \\ \vdots & 1 & 8 & 1 & \vdots \\ & \ddots & 1 & \ddots & 1 \\ 1 & & \dots & 1 & 20 \end{bmatrix}$$

- Generate a random 4 × 7 matrix G which is formed by the numbers between 0 and 1.
- A square matrix is called upper triangular if all the entries below the main diagonal are zero, generate a 55 upper triangular matrix H with the main diagonal [1 2 3 4 5] and 2s for the rest of none zero values.

$$\begin{bmatrix} 1 & 2 & \dots & 0 \\ 0 & 2 & \ddots & 2 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 5 \end{bmatrix}$$

- Make hSum the column-wise sum of H. The answer should be a row vector. (Use sum)
- Make I a random 6 × 6 matrix with values between 0 and 1 using rand. Find the elements that have values ≤ 0.5 and set those values to 0, and set the elements with values ≥ 0.5 to 1. (Use find)

Sample input: Q1_92123456

Sample output: values of A, B, C, D , E, F , G,H hSum and I in separate lines.

Plot

- Write a MATLAB script that plots $f(x) = 4\sin(x) + \cos(x)$ which is displayed using “ - “ and $g(x) = \sin(x) - 2\cos(x)$ which is displayed using “ * “ in a single figure. Do not forget to label the axes, a legend to describe the function you have plotted and a title for your plot. Plot these two functions using the vector x from -2 to 2. Use hold on to turn on the hold property of the figure and xlim to set the x axis to be from -2 to 2 and use ylim to set the y axis ranging from -4.5 to 4.5. You should get an output , like Figure 1:
- Plot the function below in a separate figure. Do not forget to label the axes and a legend to describe your function. Use xlim and ylim to set the axes ranging from -4 to 4 and -6 to 6, respectively.

$$f = \begin{cases} x + 0.5\pi & x < -0.5\pi \\ \cos(x) & -0.5\pi < x < 0.5\pi \\ -x + 0.5\pi & x > 0.5\pi \end{cases} \quad (1)$$

Name of your file: Q2_92123456

Output: two figures

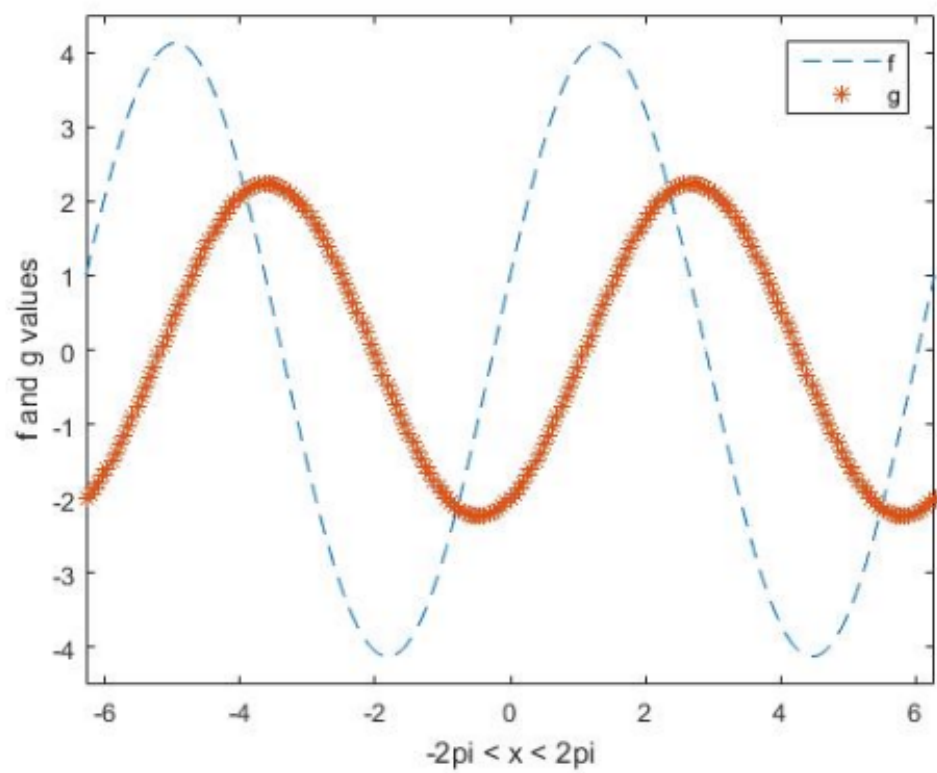


Figure 1: plotting g f