

## MA6624 Matlab Final Assignment

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1.(a) create a vector x with the elements:

i) 2, 4, 6, 8 ..., 20

ii) 0, 1/2, 2/3, 3/4, 4/5

(b) create a vector x with the elements,

$$x_n = \frac{(-1)^{n+1}}{2n-1}, \quad n = 1, 2, \dots, 100$$

2.(a) Define the following matrix A in Matlab:

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix} \quad (1)$$

(b) Define a column vector U, which is set to the first column of A.

(c) Define a row vector V which is set to the second row of matrix A.

(d) Define a column vector W, which contains the third column of A in reverse order.

(e) Define a array X, which contains the odd-numbered rows of A.

3. (i) Put the following two sets of data in a data file,with the filename: data.1

$$(1, 3, 5, 7, 9), \quad (2, 4, 6, 8, 10)$$

and then, use the "load" to load the data. In the final step, define a column vector x corresponding to fist set of data, define a row vector y corresponding to the second. (ii) Use "save" to save the data "x" and "y" in the file datexy.txt

4. (i) Use Matlab to plot

$$y = \frac{\sin x}{x}$$

on  $[-30, 30]$ .

(ii) Plot the following two functions on the same graph,

$$y = \frac{2}{\sqrt{3+x^2}}$$

and

$$y = \frac{-1}{\sqrt{2+x^2}}$$

on  $[-20, 20]$ . Put your name in the 'title' of the graph. Add x-label 'x', y-label 'y'.

5. Use command 'for' to calculate the following two series, respectively. Which one is convergent when n turns to infinity?

i)  $1 + 1/2 + 1/3 + 1/4 + \dots 1/n$

ii)  $1 + 1/2^2 + 1/3^2 + 1/4^2 + \dots 1/n^2$

6. Create a random vector x of dimension 10 between 0 and 100, and then, generate the following vectors

$$u(i) = \begin{cases} A & \text{if } 90 \leq x(i) \leq 100 \\ B & \text{if } 80 \leq x(i) < 90 \\ C & \text{if } 70 \leq x(i) < 80 \\ D & \text{if } 60 \leq x(i) < 70 \\ E & \text{if } x(i) < 60 \end{cases}$$

for  $i = 1, 2, \dots, 10$ .

7. Write a program (use 'function') to find the roots of the following equation:

$$ax^2 + bx + c = 0$$

8. Use bisection method to find one real root of

$$x^3 + 3x^2 + 4x + 8 = 0$$

on  $[-3, 3]$ .

9. Use Newton's method to find one real root of

$$x^3 + 3x^2 + 4x + 8 = 0$$

on  $[-3, 3]$ .

10. Write a code for solving the system  $Ax = b$  where

$$A = \begin{bmatrix} d_1 & e_1 & & & \\ c_2 & d_2 & e_2 & & \\ & \ddots & \ddots & \ddots & \\ & & & c_n & d_n \end{bmatrix} \quad b = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \\ b_n \end{bmatrix}$$