ENGR 250 Numerical Methods in Matlab
Winter 2015

Homework Assignment #1

Due: Jan. 14 (Wednesday)

You should submit your M-file, named HW1_*youremailaccount*, via email to Pandrist@greenriver.edu, before class on the due date. Your homework will be evaluated at 2:30 pm on the due date.

1. Making Vectors/Matrices

Given the following matrices, save the following vectors/matrices.

$$\boldsymbol{A} = \begin{bmatrix} 11 & 12 & 13 & 14 \\ 21 & 22 & 23 & 24 \\ 31 & 32 & 33 & 34 \\ 41 & 42 & 43 & 44 \end{bmatrix}$$

$$\boldsymbol{B} = \begin{bmatrix} 4 & 5 & 8 & 9 \\ 6 & 7 & 10 & 11 \\ 12 & 13 & 16 & 17 \\ 14 & 15 & 18 & 19 \end{bmatrix}$$

- Save the element in the second row and third column of **A** on *HW1_1.dat*
- Save a matrix containing the second and third columns of the matrix **B** on *HW1_2.dat*
- Save a matrix containing the third and fourth rows of the matrix **A** on *HW1_3.dat*
- Save a matrix containing elements that are in BOTH:
    - second through fourth rows of **A**
    - first through third columns of **A**

  on *HW1_4.dat*

2. Calculating Vectors/Matrices

Using the same matrices as 1, calculate the following:

- $\boldsymbol{A} * \boldsymbol{B}$ on *HW1_5.dat*

- $\boldsymbol{A} .* \boldsymbol{B}$ on *HW1_6.dat*
- $\boldsymbol{A}/\boldsymbol{B}$ on *HW1_7.dat*
- $\boldsymbol{A} ./ \boldsymbol{B}$ on *HW1_8.dat*

3. 2D plotting

Draw the following 2 dimensional graphs:

- $f_a(x) = 1 - \sin^2 x$ with $-10 \leq x \leq 10$ and $\Delta x = 0.1$
- $f_b(x) = e^{ix} + 1$, where $i = \sqrt{-1}$. Plot for $0 \leq x \leq 2\pi$ and $\Delta x = \frac{\pi}{20}$. *Matlab plots only the real part
- $f_c(x) = \left(1 + \frac{1}{x}\right)^x$ with $0 \leq x \leq 200$ and $\Delta x = 0.1$

The above equations are well known. They come from the following equations

$$f_a(x) \ : \quad \cos^2 x + \sin^2 x = 1$$
$$f_b(x) \ : \quad e^{i\pi} = \cos(x) + isin(x)$$
$$f_c(x) \ : \quad e = \lim_{x\to\infty} \left(1 + \frac{1}{x}\right)^x$$

Save the following files:

- $f_a(x)$ on *HW1_9.dat*
- $f_b(x)$ on *HW1_10.dat*
- $f_c(x)$ on *HW1_11.dat*

4. 2D & 3D data

Consider the following multivariable functions:

- $f_d(x,y) = \sqrt{x^2 + y^2}$ with $-8 \leq x \leq 8, \quad -6 \leq y \leq 6\,, \quad \Delta x = 0.1 \quad \Delta y = 0.05$
- $f_e(x,y) = \left(1 + \frac{iy}{x}\right)^x + 1$, Where $i = \sqrt{-1}$, $0 \leq \mathrm{x} \leq 1000$, $0 \leq \mathrm{y} \leq 2$, $\Delta x = 0.1$, $\Delta y = \frac{\pi}{20}$

Save the following:

- Column vector $f_d(3,y)$ on *HW1_12.dat*
- Row vector $f_d(x,4)$ on *HW1_12.dat*
- Matrix vector $f_d(x,y)$ on *HW1_12.dat*
- Column vector $f_e(500,y)$ on *HW1_12.dat*
- Column vector $f_e(1000,y)$ on *HW1_12.dat*
- Row vector $f_e(x,\pi)$ on *HW1_12.dat*
- Row vector $f_e(x,2\pi)$ on *HW1_12.dat*