

Introduction to Programming

Exercise 2

Question 1

Write a script called **exData**. In the script, do the following

1. Create the matrix **dataMat**:

$$\begin{bmatrix} 27 & -5 & -3 & 7 \\ 2 & -19 & -20 & 1 \\ 8 & 18 & -18 & -12 \\ -7 & -4 & 27 & -6 \\ 25 & -12 & 28 & 20 \end{bmatrix}$$

Get the following:

- a. **firstScalar** = the element in the 1st row and 3rd column.
- b. **firstVector** = elements from rows 2 and 5 from the 4th column.
- c. **firstMatrix** = elements from columns 2 to 4 from rows 3 and 5.

Change dataMat as followed:

2. Replace elements from rows 5 from column 1 and 3 with the vector [10 14]

After replacing, assign dataMat to a new matrix called **dataM2**.

3. Delete the 2nd column from dataMat. After deleting, assign dataMat to a new variable called **dataM3**.

4. Replace elements from rows 4 and 5, columns 1 and 2 with the matrix $\begin{bmatrix} 13 & 0 \\ 17 & -9 \end{bmatrix}$. After replacing it, assign dataMat to a new variable called **dataM4**.

5. Without making any changes to dataMat, create **dataM5**: concatenation of dataMat and the following

matrix: $\begin{bmatrix} 10 & -19 & 3 \\ 21 & 16 & -11 \end{bmatrix}$

6. Use 'size' command to get **colNum** = the number of columns of dataMat.

Question 2

Michael, Evan, Jake and Gabe are training for a marathon. To keep each other motivated, they decided to keep a table with the total mileage each of them ran during the first five weeks of training.

Create a script called **runTraining**. In the script, do the following:

1. Create the matrix **allMiles**

$$\begin{bmatrix} 10 & 10 & 12 & 5 & 9 \\ 11 & 15 & 14 & 17 & 11 \\ 10 & 9 & 11 & 8 & 2 \\ 9 & 12 & 14 & 16 & 10 \end{bmatrix}$$

Each row in this matrix represents the total mileage of each of the four runners listed above (from row 1 to row 4: Michael, Evan, etc.). Each column represents the total miles per week (from column 1 to column 5: Week 1, Week 2, etc.).

2. After filling out the table, Gabe realized that they left out the 8 mile run they all ran together during the last week of training and should therefore add 8 miles to all of the runners' mileage of 5th week. Update **allMiles** and assign the updated matrix to a new variable called **miles1**.
3. On the 6th week of training each of the runners ran the following miles:
Michael: 20 Evan: 18
Jake: 12 Gabe: 22
Add the miles for the 6th week as a new column to the matrix **allMiles**, and assign the updated matrix to a new variable called **miles2**.
4. Sum the total miles each of the runners ran during the six weeks of training and assign the answer to a new column vector called **miles3** (make sure the miles appear in the original order of the runners).
5. Jake injured his knee during week number 6 and decide not to continue training. Remove the row of Jakes miles from the matrix and assign the updated miles matrix to a new variable called **miles4**.
6. Use the 'size' command to create the variable **miles5** = the number of runners still training.
7. Create the matrix **miles6** = a matrix containing the miles Michael and Gabe ran in the 2th and 5th weeks of training.

8. Calculate the difference between the amount of miles each runner ran during the 6th week and the 1st week and assign the results to a new column vector called **miles7**.
9. Calculate the average mileage for each week of training (averaged across all runners), and assign the average to a new row vector called **miles8**.
10. The total mileage the runners should run on the 7th week is calculated from their previous training history.

The amount they need to run is calculated as following: $\frac{\sqrt{w_1^2 + w_2^2 + \dots + w_6^2}}{2}$

Where w_1 represents the miles a runner ran during the first week.

Calculate how many miles each runner needs to run during week 7, according to this formula, and assign the miles to a new column vector called **miles9** (make sure the miles appear in the original order of the runners).

Notes:

- The scripts (.m files) you write should be sent by e-mail to: ex.matlab@gmail.com
Files should be sent no later than **Monday (6.11.17) / Wednesday (8.11.17)** (according to your tirlgul group) - at midnight.
- Hard copy of your exercise should include printed copies of your scripts. Please staple all the sheets together and clearly write your name and ID number on all of them.
The hard copies should be submitted at the **beginning of your tirlgul group**.

Good Luck!