**Exercise #2 -Variables and Matrix Manipulation**

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**Instructions**

1. The mail subject should be: **'matlab intro 2021b exercise 2'**.   
   Attach only the script file to your mail.
2. **Do not submit a script that does not run properly**. To check your script run without errors make sure your workspace is cleared, ant then run the script (press F5).
3. Name your script "**hw2\_< ID number 1>\_< ID number 2>.m**".
4. Divide your code into **sections** (according to the questions or any other reasonable division). Use the '%% ' sign
5. Give your variables **meaningful names**.
6. **Document** your work with comments in the script. (use the '%' sign).
7. Any number that appears in your script should be assigned to a variable (i.e. do NOT use "magic numbers").
8. You are expected to use **matrix calculations**. You are NOT allowed to use loops in this exercise.
9. Use the following header and questions separator:

%%

% HW\_<No. of assignment> solution

% <your name & ID number>

% for example:

% HW\_2 solution

% Israel Israeli 123456789

% David Davidi 987654321

%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% <short description of what your script is doing for

% example: this script load experiments data and

% analyzes it. The output is the statistics

% calculations results.

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%% Q1

% <Document the code: briefly describe the question and how you solved it>

disp('\*\*\* Question 1 \*\*\*');

<Q1 output>

disp(' ');

%% Q2

% <Document the code: briefly describe the question and how you solved it>

disp('\*\*\* Question 2 \*\*\*');

<Q2 output>

disp(' ');

**Questions**

1. In this exercise you will get to know the function *sort*.

Open the MATLAB Help by clicking the "?" icon (or run *doc*). Open the "index" tab and look up the function "sort". Another way to use the help is to write in you command window: “doc sort”. Try to use this option as well.

What's the input and output for this function? Describe the case where there are two outputs (As comments in you script).

1. In the following exercise you will practice data and matrix manipulations. The file data\_hw2\_2021b.mat, which you will load into workspace, contains the data of 30 participants in 3 experiments (3 dates of experiment, 10 participants per date), each participant was tested on 4 tests. The data contains the experiment date, the participant’s age, gender, test1\_score, test2\_score, test3\_score, test4\_score.

Load the file “data\_hw2\_2021b.mat” into your workspace. Note that your script should run on any machine. Therefore, you should not use full path, but load the file from the current directory (and make sure the file is located in the current directory, and you set the current directory correctly).

1. Create a new matrix with all four tests together concatenated.
2. Find the median, mean, max and minimum for the 4 tests. Display the result in the following format:

“Test No.<the test number> results:

median: < > mean: < > max: < > min: < > “

\* Tip: you can use fprintf//disp/num2str, or any other appropriate MATLAB function to display the results (use help/doc to read their documentation).

1. Find the participants’ median of the 4 tests. What are the highest and the lowest median scores? What is the average of the medians? Display the results, **rounded down**, in the following format:

“The highest median score is:

The lowest median score is:

The average score of all medians is: “

1. Find the participants weighted average of the 4 tests. The first test weight is 20%, the second: 15%, the third: 35% and the fourth 30%. **Make sure to use array arithmetics correctly**. How do the weights affect the experiment results? Print the results (**rounded up**):

“The lowest weighted score is:

The highest weighted score is:

The average weighted score is: “

1. Find the 3 participants that got the highest scores in test number 4. Display the result in descending order, use the following format:

“1. Participant no. <index of participant> <date> <gender> <test4\_score>”

“2. Participant no. <index of participant> <date> <gender> <test4\_score>”

“3. Participant no. <index of participant> <date> <gender> <test4\_score>”

1. We would like to find out how well the top 3 participants in test4 (from previous question) did in test1 (what is their rank in test1). In order to do that you need to sort the data according to test1 scores in descending order. Find the position of the top 3 from Q7 among the 30 participant’s test1 scores. Display the result using the following format (for all the 3):

“test4 top student #1 is in position: <the participant position> in test1 scores”.

“test4 top student #2 is in position: <the participant position> in test1 scores”.

“test4 top student #3 is in position: <the participant position> in test1 scores”.

1. How many females participated in each date? Display the result in the following format:

“ <date> number of females < the number of females> “

1. Remove from the data all people aged over 60, and under 21, and create a new matrix. For all the subsequent questions you can use the data after removing those participants. How does that affect the experiment results? Find again the median, mean, max and minimum for the 4 tests. Display the result in the following format:

“Test No. < > results:

median: < > mean: < > max: < > min: < > “

1. Find all the places where the score is below 55 and replace it with 60.

Find the new average for each test, display the result **rounded**, using the following format:

“Test No. < > new average is: < >”

1. Select every 3rd participant starting from the first participant. Save the data in a vector called “group1”.

Select every 3rd participant starting from the second participant, save the data in a vector called “group2”.

What is the age median in the each group? Display the results in the following format:

“Group 1 age median is: “

“Group 2 age median is: “