PNI MATLAB summer bootcamp
Week 1 problem set

1) Let's begin with a simple question. Define the below variables:
   a. length=2;
   b. width=5;
   c. height=7;

   Write a code to calculate the volume of the cube? Print the values of variable volume and width of the cube for the user by using the following sentence:
   "The volume of the cube is 70 and the width of the cube is 5"

2) There will be instances when you want to delete specific variables from the MATLAB workspace. Once you finish the above problem, there will be four variables in the workspace corresponding to length, width, height, and volume. Tell MATLAB to just delete/remove the variable 'height' from the workspace.
   Hint: Use clearvars: https://www.mathworks.com/help/matlab/ref/clearvars.html

3) Which of these is not an acceptable name for a variable? Why?
   a. 2_variable_name
   b. persistent
   c. otherwise
   d. otherWise
   e. While
   f. hello_world
   g. welcome_to_the_summer_matlab_bootcamp_course_at_princeton_university

4) Create a matrix and name it as given_matrix
   given_matrix=[4:3:27; -30:2:-16; 7:4:38]

$$\text{given\_matrix} = \begin{bmatrix} 4 & 7 & 10 & 13 & 16 & 19 & 22 & 25 \\ -30 & -28 & -26 & -24 & -22 & -20 & -18 & -16 \\ 7 & 11 & 15 & 19 & 23 & 27 & 31 & 35 \end{bmatrix}$$

   a) Print the size of the given_matrix
   b) Replace the element -20 by 3; 15 by 6; and 22 by 8.
   c) Using MATLAB, how will you select the values -24 -22 -20 -18?
   d) Print all the values of the third row.
   e) Print all the values of the fifth column.
   f) Print all the values of (second and third row) and (fifth to last column).
   g) Print all the values of (first and third row) and (first, third, fourth, fifth, and seventh column).

5) In the class we learnt that we could use the syntax

   randi(max_integer,num_row, num_col)

to generate a matrix of defined size with elements between 1 and max_integer (which is a positive integer). Look at the description of randi function and figure out how you can use this function to generate a 3X5 matrix with numbers between -3 and 3.

6) Let us once again go back to the given_matrix which we defined in the beginning of question 4. Our goal is to use the max and min function of MATLAB. Read the description of max (https://www.mathworks.com/help/matlab/ref/max.html) and min (https://www.mathworks.com/help/matlab/ref/min.html) function.

   a. Find the maximum element of each row.
   b. Find the minimum element of each row.
   c. Find the maximum element of each column.
   d. Find the minimum element of each column.

7) In this problem, let us learn how to use sort function of MATLAB.
   a. Using randi function create a row-array of 20 elements consisting of positive integers between 1 and 7. Name this array as rand_int_array.
   b. Use sort function of MATLAB to sort the elements of rand_int_array in an ascending order.
   c. Now use the same function to sort them in descending order.

   Here is the link to the 'sort' function: https://www.mathworks.com/help/matlab/ref/sort.html

8) Now, our goal is to learn another important function of MATLAB called as unique. In the above question, you can see that there are so many elements which are repeating. Many a times in your analysis, you just want to know the unique elements in your data. Use the 'unique' MATLAB function to find all the unique elements of rand_int_array.

   Here is the link to the 'unique' function:
   https://www.mathworks.com/help/matlab/ref/double.unique.html