```
%  Assignment 8
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%  IDE: MATLAB


%  Note: The functions used in the questions are described at the end of the
%  document in the order they are used.
```

Question 1

Write a function that takes a vector and counts how many even numbers there are. [Also odd numbers] (i) Write a function that returns a vector of all the even valued elements in a given vector. E.g., if the given vector is [2 2 4 5 6 9], the returned vector is [2 2 4 6] (ii) Write a function that returns a vector of all the elements in even positions in a given vector, i.e. every second element in the vector. E.g., if the given vector is [2 2 4 5 6 9], the returned vector is [2 5 9].

```
clc;
close all;
clear all;

A = [2 2 4 5 6 9];
[oddCount,evenCount,evenVal,evenPosVal] = getVectorProps(A);
fprintf("No. of odd elements:- %d\nNo. of even elements:- %d\n",oddCount,evenCount);
fprintf("Even elements:-\n");
disp(evenVal);
fprintf("Elements at Even Position:-\n");
disp(evenPosVal);
```

```
No. of odd elements:- 2
No. of even elements:- 4
Even elements:-
2     2     4     6

Elements at Even Position:-
2     5     9
```

Question 2

Given a vector of heights of students in a class (in meters), return the average height. Given an n by 2 that has the heights of students in a class, where the first column is the part of the height before the decimal point (in meters), and the second column is the part of the height after the decimal point (i.e. in cm), return an n by 1 vector that contains the height of the students in m. Also: in cm. E.g., a row [1 63] means that the height of the person is 1m and 63cm.

```
clc;
close all;
clear all;
fprintf('Enter number of students:-');
val = inputdlg('Enter number of students:-');
n = str2num(val{1});
disp(n);
A = zeros(n,2);
for i = 1:n
    fprintf('Enter height of Student %ld metre Value:-',i);
    val = inputdlg('Enter height of Student '+string(i)+' metre Value:-');
    A(i,1) = str2num(val{1});
    disp(A(i,1));
    fprintf('Enter height of Student %ld centimetre Value:-',i);
    val = inputdlg('Enter height of Student '+string(i)+' centimetre Value:-');
    A(i,2) = str2num(val{1});
    disp(A(i,2));
end
avgHeight = getAvgHeight(A);
fprintf('The Average Height of the students is %ld m %ld cm.\n',avgHeight(1,1),avgHeight(1,2));
```

```
Enter number of students:-     5

Enter height of Student 1 metre Value:-     1

Enter height of Student 1 centimetre Value:-    73

Enter height of Student 2 metre Value:-     1

Enter height of Student 2 centimetre Value:-    75

Enter height of Student 3 metre Value:-     1

Enter height of Student 3 centimetre Value:-    60

Enter height of Student 4 metre Value:-     1

Enter height of Student 4 centimetre Value:-    81

Enter height of Student 5 metre Value:-     1

Enter height of Student 5 centimetre Value:-    52

The Average Height of the students is 1 m 6.820000e+01 cm.
```

Question 3

Push and pop from a stack

```
clc;
close all;
clear all;
stack = [];
p = 0;
while p ~= 2
    fprintf('Enter your action (0 - Push, 1 - Pop, 2 - Exit) :');
    val = inputdlg('Enter your action (0 - Push, 1 - Pop, 2 - Exit) :');
    p = str2num(val{1});
    disp(p);
    if p == 0
        fprintf('Enter a number to push into Stack :');
        val1 = inputdlg('Enter a number to push into Stack :');
        val = str2num(val1{1});
        disp(val);
        stack = [stack val];
        fprintf('Current Stack:\n');
        disp(stack);
    elseif p == 1
        val = stack(end);
        fprintf('Popped Value: %ld\n',val);
        stack(end) = [];
        fprintf('Current Stack:\n');
        disp(stack);
    else
        fprintf('Program Complete.\n');
        break;
    end
end
```

```
Enter your action (0 - Push, 1 - Pop, 2 - Exit) :     0

Enter a number to push into Stack :     2

Current Stack:
     2

Enter your action (0 - Push, 1 - Pop, 2 - Exit) :     0

Enter a number to push into Stack :     4

Current Stack:
     2     4

Enter your action (0 - Push, 1 - Pop, 2 - Exit) :     0

Enter a number to push into Stack :     5

Current Stack:
     2     4     5

Enter your action (0 - Push, 1 - Pop, 2 - Exit) :     1

Popped Value: 5
Current Stack:
     2     4

Enter your action (0 - Push, 1 - Pop, 2 - Exit) :     0

Enter a number to push into Stack :     2

Current Stack:
     2     4     2

Enter your action (0 - Push, 1 - Pop, 2 - Exit) :     1

Popped Value: 2
Current Stack:
     2     4

Enter your action (0 - Push, 1 - Pop, 2 - Exit) :     2

Program Complete.
```

Question 4

Write a function that takes a matrix and returns the sum of its Eigenvalues.

```
clc;
close all;
clear all;

fprintf('Enter number of rows:-');
val = inputdlg('Enter number of rows:-');
R = str2num(val{1});
```

```
disp(R);

fprintf('Enter number of columns:-');
val = inputdlg('Enter number of columns:-');
C = str2num(val{1});
disp(C);

P = zeros(R,C);
for i=1:R
    for j = 1:C
        fprintf('Enter value at (%d,%d):-',i,j);
        val = inputdlg('');
        P(i,j) = str2num(val{1});
        disp(P(i,j));
    end
end
s = getEigenSum(P);
fprintf('The sum of Eigen values is %ld.\n',s);
```

```
Enter number of rows:-     3

Enter number of columns:-     3

Enter value at (1,1):-     2

Enter value at (1,2):-     5

Enter value at (1,3):-     7

Enter value at (2,1):-     6

Enter value at (2,2):-     8

Enter value at (2,3):-     7

Enter value at (3,1):-     2

Enter value at (3,2):-     3

Enter value at (3,3):-     5

The sum of Eigen values is 1.500000e+01.
```

Question 5 A

Given a vector of unique names, and given one particular name that has to be found, write a function that searches for that name from the vector and returns the element number. Proceed to returning row/column number from matrix of names.

```
clc;
close all;
clear all;

names = {};
while true
    fprintf('Enter a name to be added in list(0 to Stop): ');
    val = inputdlg('Enter a name to be added in list(0 to Stop): ');
    name = val{1};
    disp(name);

    if(name=='0')
        break;
    end
    names = [names,name];

end
fprintf('Enter a name to be searched: ');
val = inputdlg('Enter a name to be searched: ');
search = val{1};
disp(search);

indexC = strfind(names,search);
index = find(not(cellfun('isempty',indexC)));

fprintf('The string is found at following indices:\n');
disp(index);
```

```
Enter a name to be added in list(0 to Stop): krunal
Enter a name to be added in list(0 to Stop): mahesh
Enter a name to be added in list(0 to Stop): suresh
Enter a name to be added in list(0 to Stop): lok
Enter a name to be added in list(0 to Stop): krunal
Enter a name to be added in list(0 to Stop): 0
Enter a name to be searched: krunal
The string is found at following indices:
     1     5
```

Question 5 B

Given a vector of unique names, and given one particular name that has to be found, write a function that searches for that name from the vector and returns the element number. Proceed to returning row/column number from matrix of names.

```
clc;
close all;
clear all;

fprintf('Enter number of rows: ');
val = inputdlg('Enter number of rows: ');
r = str2num(val{1});
disp(r);

fprintf('Enter number of columns: ');
val = inputdlg('Enter number of columns: ');
c = str2num(val{1});
disp(c);

names = strings([r c]);
for i = 1:r
    for j = 1:c
        fprintf('Enter name for cell at (%d,%d):-',i,j);
        val = inputdlg('');
        names(i,j) = val{1};
        disp(names(i,j));
    end
end

fprintf('Enter a name to be searched: ');
val = inputdlg('Enter a name to be searched: ');
search = val{1};
disp(search);

indexC = strfind(names,search);
```

```
index = find(not(cellfun('isempty',indexC)));

[r1,c1] = size(index);
fprintf('The name was found at (Row,Column):\n');
for i=1:r1
    col = idivide(int32(index(i,1)),int32(r),'ceil');
    row = mod(int32(index(i,1)),int32(r));
    if row==0
        row = r;
    end
    fprintf('( %ld %ld )\n',row,col);
end
```

```
Enter number of rows:      2

Enter number of columns:      3

Enter name for cell at (1,1):-krunal
Enter name for cell at (1,2):-miracle
Enter name for cell at (1,3):-midone
Enter name for cell at (2,1):-kuroky
Enter name for cell at (2,2):-miracle
Enter name for cell at (2,3):-gh
Enter a name to be searched: miracle
The name was found at (Row,Column):
( 1 2 )
( 2 2 )
```

Question 6

Write a function that takes a vector that contains the marks of students and returns the pass/fail status. Any score that is greater than, or equal to 30 is considered to be a passing score. Return a vector of the same size as the input vector, but has a particular element as 1, if the corresponding student passed, and 0 otherwise.

```
clc;
close all;
clear all;

fprintf('Enter number of students: ');
val = inputdlg('Enter number of students: ');
n = str2num(val{1});
disp(n);

A = zeros(n,1);
for i = 1:n
    fprintf('Enter marks of Student %ld : ',i);
    val = inputdlg('Enter marks of Student '+string(i)+' : ');
    A(i,1) = str2num(val{1});
    disp(A(i,1));
end
status = getResult(A);
fprintf('The result of the students is as follows:-\n');
disp(status);
```

```
Enter number of students:      5

Enter marks of Student 1 :      28

Enter marks of Student 2 :      30
Enter marks of Student 3 :     35

Enter marks of Student 4 :     78

Enter marks of Student 5 :     81

The result of the students is as follows:-
   0
   1
   1
   1
   1
```

Functions Used in Assignment

```
function [oddCount,evenCount,evenVal,evenPosVal] = getVectorProps(A)

    oddCount = 0;
    evenCount = 0;
    evenVal = [];
    evenPosVal = [];

    [r c] = size(A);

    for i = 1:c
       if mod(A(i),2) == 1
           oddCount = oddCount + 1;
       else
           evenCount = evenCount + 1;
           evenVal = [evenVal A(i)];
       end
       if mod(i,2) == 0
           evenPosVal = [evenPosVal A(i)];
       end
    end
end

function avg = getAvgHeight(A)
    avg = mean(A,1);
end

function s = getEigenSum(A)
    [eigenVec, D] = eig(A);
    eigenVal = diag(D);
    s = sum(eigenVal);
end

function result = getResult(A)
  result = A>=30;
end
```

Published with MATLAB® R2018b