Lab 2

1. Identify what is wrong with the following MATLAB command sequences and/or answers. If an assignment is incorrect, explain why. If an answer is wrong, give the correct answer.

(i)

```
>> x=0:10;
>> y+1=x;
```

(ii)

```
>> (2+7)\15+12
ans = 0.3333
```

(iii)

```
>> B=0:pi/2:5*pi;
>> B(0)
ans = 0
```

(iv)

```
>> c=[5 8 7 ; 4 5 8]
c = 5 8 7; 4 5 8
```

(v)

```
>> A=[4,8,1]; B=[5,9,6];
>> A*B
```

2. Make the following variables:

$$a = [5 \quad 4.8 \quad 4.6 \quad \cdots \quad -4.8 \quad -5]$$
$$b = [10^0 \quad 10^{0.01} \quad 10^{0.02} \quad \cdots \quad 10^{0.99} \quad 10^1]$$
$$c = Hello$$

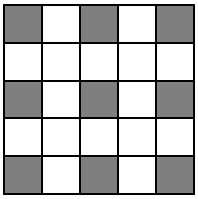
3. Make the following matrices and calculate their eigenvalues and eigenvectors:

$$A = \left[\begin{pmatrix} 2 & \cdots & 2 \\ \vdots & \ddots & \vdots \\ 2 & \cdots & 2 \end{pmatrix}\right] \in \Re^{9\times 9} \qquad B = \begin{bmatrix} 1 & 11 & \cdots & 91 \\ 2 & 12 & \ddots & 92 \\ \vdots & \vdots & \ddots & \vdots \\ 10 & 20 & \cdots & 100 \end{bmatrix}$$

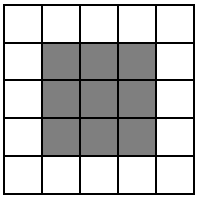
$$C = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 4 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 5 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 4 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 3 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

4. An M-by-M matrix `X` is given. Without using loops, extract values from matrix `X` to create the following:

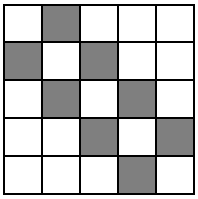
   i) matrix `A` – composed of all values in odd columns AND odd rows of `X`, e.g.:



   ii) matrix `B` – composed of all entries of `X`, except for the outside rows and columns, e.g.:



   iii) matrix `C` – composed of diagonals surrounding the middle diagonal of matrix `X`, e.g.:



5. Without using loops, calculate the sum of the following series

$$1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\cdots$$

   for the first 10,000 terms. There are several ways to implement this. You may find functions such as `sum`, `ones`, or `dot` useful. Store the result in an array `seriesSum`.

6. Load the image 02Lena.bmp by typing:

```
A = imread('02Lena.png');
```

   What is the type of variable A? Display the image by typing:

```
imshow(A);
```

   Now multiply the entries of A to 1.5. Display the image and report what you observe.