

I. Using Matlab

1. (Skip)

2. a. `>> x = randperm(1000);`

ANS: x is a 1x1000 array with 1000 random values which values are from 1 to 1000.

b. `>> a = [1,2,3; 4 5 6; 7 8 9];`

`>> b = a(2,:);`

ANS: a is a 3x3 matrix and b is a 1x3 array which values are the second row of a.

c. `>> a = [1,2,3; 4 5 6; 7 8 9];`

`>> b = a(:);`

ANS: b is a 9x1 array which values are rows of 'a' that concatenate row by row.

d. `>> f = randn(5,1);`

`>> g = f(find(f > 0));`

ANS: f is a 5x1 array with normally distributed random number. And g is an array with positive values of f variable.

e. `>> x = zeros(1,10)+0.5;`

`>> y = 0.5.*ones(1,length(x));`

`>> z = x + y;`

ANS: x and y are 1x10 array with 0.5 of every elements. z is an addition of these two array so z is a 1x10 array with 1 of every elements. The different of x and y is the way to define array.

f. `>> a = [1:100];`

`>> b = a([end:-1:1]);`

ANS: a is a 1x100 array with every element increasing 1 from 1 to 100. And b is a 1x100 array with every element decreasing 1 from 100 to 1.

3. a. Use rand to write a function that returns the roll of a six-sided die.

ANS: `function y = die()`

`r=randperm(6);`

`y=r(1);`

`end`

b. Use the reshape command to form a new matrix Z

ANS: `z = reshape(y,2,3)`

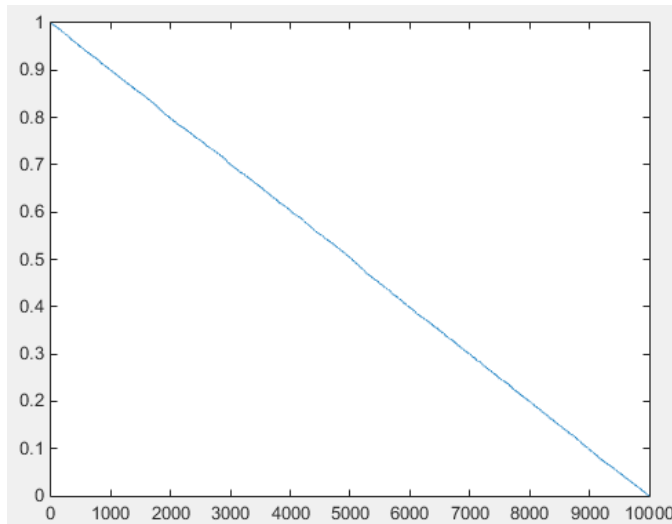
c. Use the max and find functions to set x to the maximum value that occurs in Z (above), and set r to the row it occurs in and c to the column it occurs in.

ANS: `[r,c]=find(z==max(max(z)))` % find the max value in array z; max(max(x)) is the max value in z.
% find function can return that value by row and column.

d. Let v be the vector: `v = [1 8 8 2 1 3 9 8]`. Set a new variable x to be the number of 1's in the vector v.

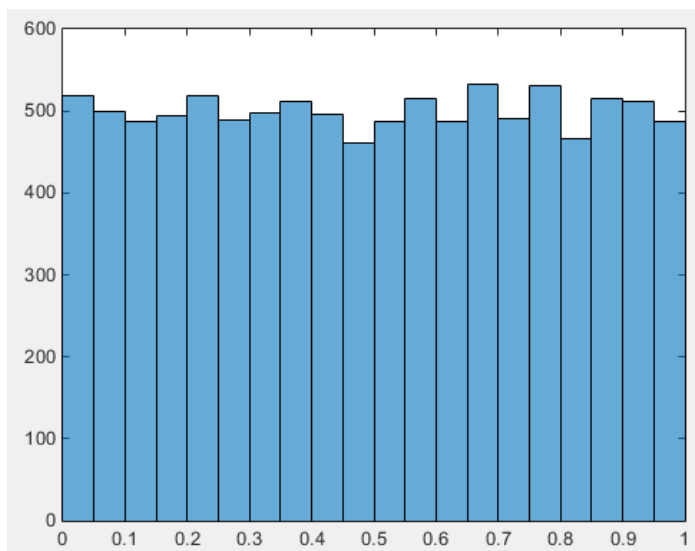
ANS: `x=length(find(v==1))` % find 1's in the vector v and count the number.

4. a. **ANS:**



b. **ANS:** `h=histogram(B,20)`

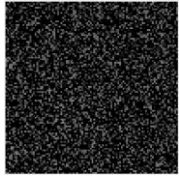
% <http://www.mathworks.com/help/matlab/ref/histogram.html?searchHighlight=histogram>



c. **ANS:** `Z=A(51:100,1:50); imshow(Z)`

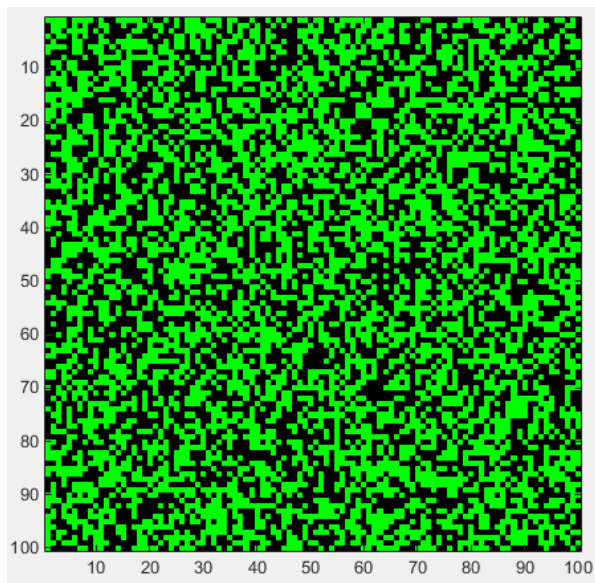


d. **ANS:** `W=A-mean2(A); imshow(W)`



e. **ANS:**

```
Y=zeros(100,100,3); %initial RGB image with zero
I=find(A>= mean2(A));
Y(I)=255;
Y(:, :, 2)=Y(:, :, 1);
Y(:, :, 1)=Y(:, :, 3);
figure
imagesc(Y)
```



II. Short programming example

ANS: (Next Page)

a) Grayscale image



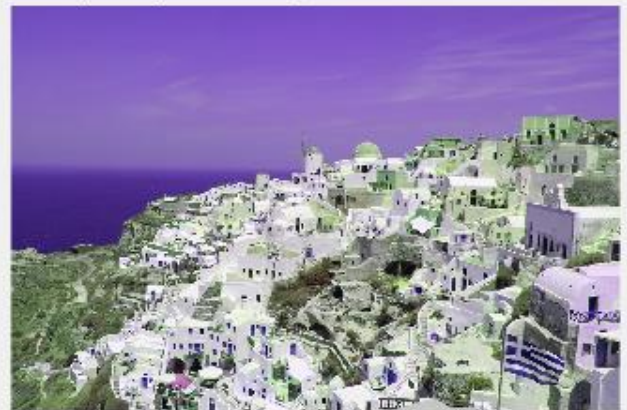
b) Negative image



c) Mirror image



d) Swap red and green color channels



e) Average input color image with mirror image



f) Add random value and clip value out of scope

