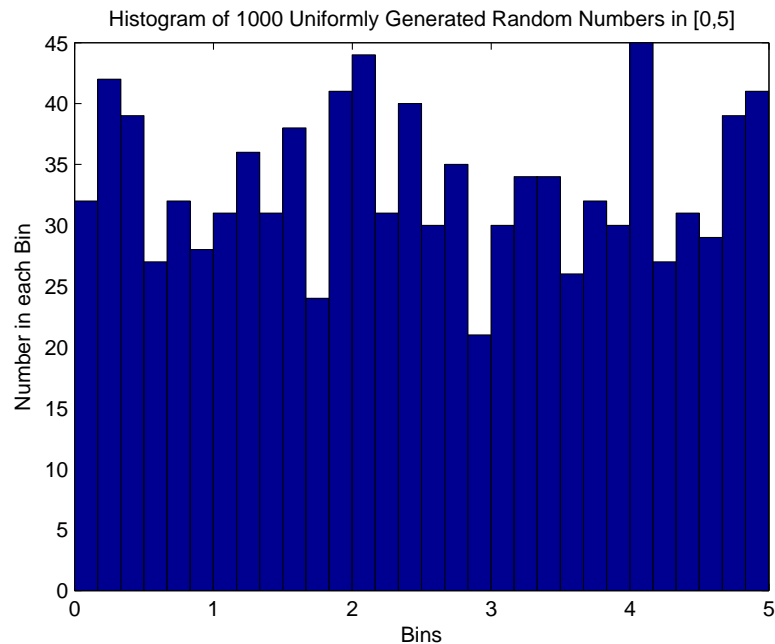


Typical Solution for Project No. 1 (Part I)

ECE 642
Dr. Bijan Jabbari

A. Use MATLAB functions to generate 1000 samples of a uniform random number between 0 and 5 and obtain the mean and standard deviation. Also plot the histogram.

- Mean= 2.4825
- Standard Deviation = 1.4263



MATLAB CODE:

```
% A typical solution to project 1 part a, ECE 642, Dr. Bijan
%Jabbari
% This program "project1a.m" generates 1000 uniform random
%numbers
% between 0 and 5 and provides associated statistics and
%histogram.
%
[u]=5*rand(1,1000);
mean(u)
std(u)
```

```

whitebg;
hist(u,30);
xlabel('Bins');
ylabel('Number in each Bin');
title('Histogram of 1000 Uniformly Generated Random Numbers in [0,5]');

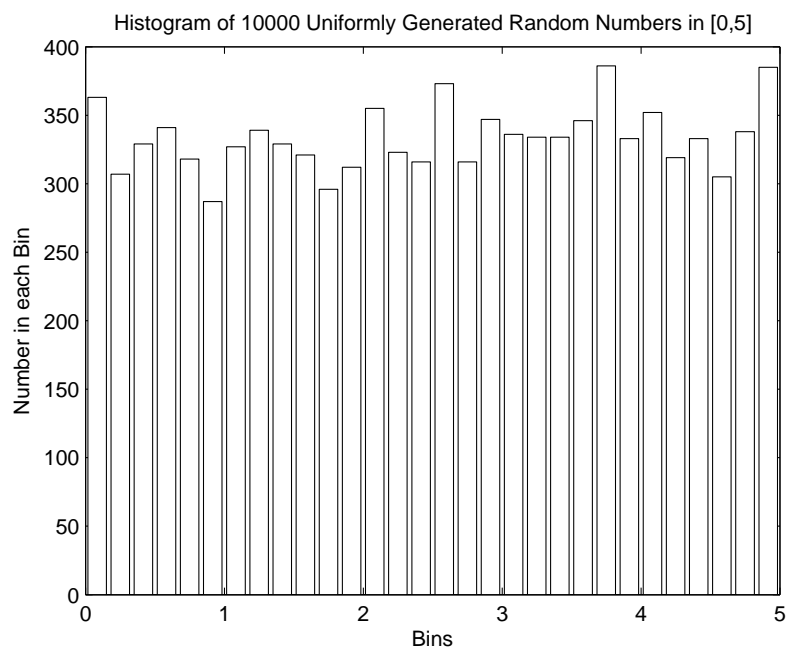
```

Or a alternative solution is:

- $m = 2.5624$
- $\sigma = 1.4353$

B. Do A for 10,000 samples

- Mean= 2.5333
- Standard Deviation = 1.4483
- $m = 2.5068$
- $\sigma = 1.4563$



MATLAB CODE:

```

% Another typical solution to project 1 part b, ECE 642, Dr.
%Bijan Jabbari
% This program "project1b.m" generates 10000 uniform random
% numbers
% between 0 and 5 and provides associated statistics (mean, m,
% and

```

```

% standard deviation, sigma), and plots the histogram.
%
% Generate 10000 Random Numbers Between [0,5]
[u]=5*rand(1,10000);
%
% the mean of the vector u;
m=mean(u)
%
% the standard deviation for the vector u;
sigma=std(u)
%
% the histogram of the vector u, using no_bins for the number of
% bins as the parameter for the matlab function "hist".
no_bins=30;
[N,X]=hist(u,no_bins);
colordef white;
bar(X,N,'w');
xlabel('Bins');
ylabel('Number in each Bin');
title('Histogram of 10000 Uniformly Generated Random Numbers in [0,5]');

```

C.Now do part A for 10 different seeds and average the means and standard deviations

The output is:

```

Seed is 1223
Seed is 340506
Seed is 54904333
Seed is 73232
Seed is 9.355268e+010
Seed is 73
Seed is 174544
Seed is 350543
Seed is 42256
Seed is 90423056
Mean= 2.4921
Standard Deviation= 1.4364

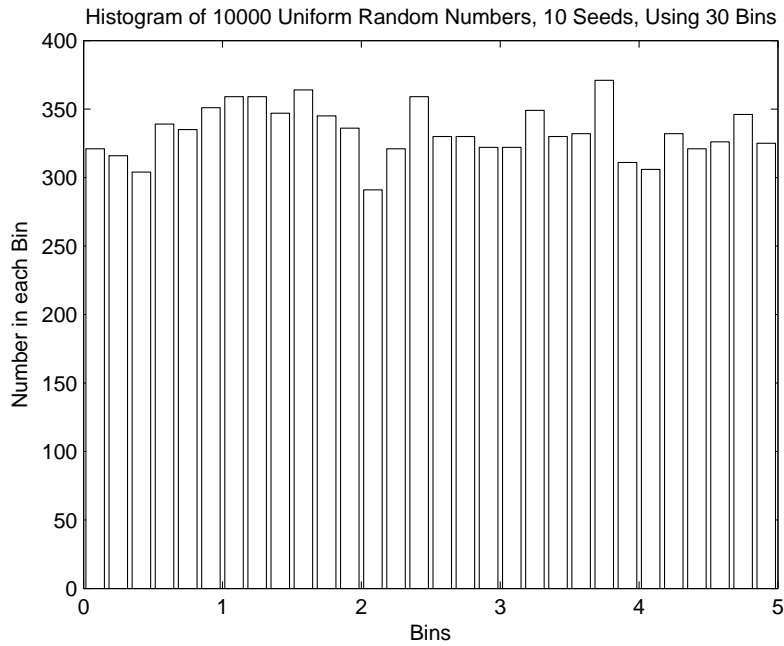
```

MATLAB CODE:

```

% A typical solution to project 1 part c, ECE 642, Dr. Bijan
%Jabbari
% This program "project1c.m" generates 10000 uniform random
%numbers
% between 0 and 5 by generating 10 sample runs of 1000 random
% numbers with 10 different seeds of and provides associated
%statistics
% (mean, m, and % standard deviation, sigma), and plots the
%histogram.

```



```
%
% we set the 10 different seeds in the vector "seeds"
seeds=[1223 340506 54904333 73232 93552677666 73 174544 350543 42256
90423056]; u=[];
% in the vector u (empty at this point) we are going to collect all the
% 10 sample runs of 1000 random numbers with 10 different seeds
for k=1:10
    % Sets the seed for random number generation
    disp(['Seed is ' num2str(seeds(k))]);
    rand('seed',seeds(k));
    % Generate 1000 Random Numbers Between [0,5]
    [v]=5*rand(1,1000);
    u=[u v];
end
% now, we have collected all the random sequences in the vector u. So,
% we can delete from memory the variables v seeds and k;
%
clear v seeds k;
%
% furthermore, all the processing will be applied to the vector u;
% the mean of the vector u;
m=mean(u);
disp(['Mean= ' num2str(m)]);
%
% the standard deviation for the vector u;
sigma=std(u);
disp(['Standard Deviation= ' num2str(sigma)]);
```

```

%
% the histogram of the vector u, using no_bins for the number of bins
% as the parameter for the matlab function "hist".
no_bins=30;
[N,X]=hist(u,no_bins);
colordef white;
bar(X,N,'w');
xlabel('Bins');
ylabel('Number in each Bin');
title(['Histogram of 10000 Uniform Random Numbers, 10 Seeds, Using ' ,
num2str(no_bins), ' Bins']);

```