2a

```
clear
clc

maxNum = 10000;
stepSize = 100;
%% generate experimental outcomes
for i = 1 : maxNum
H(i) = binornd(1, 0.5, 1);
end
%% plot results
i = 1;
for totalNum = 10 : stepSize: maxNum
p(i) = head(totalNum,H);
i = i + 1;
end
plot(10 : stepSize: maxNum, p)
xlabel('number of experiments')
ylabel('probability')
%% function for probability computation
function y = head(totalNum,H)
y = sum(H(1:totalNum))/totalNum;
end
```

2b

```
clear
clc

maxNum = 10000;
stepSize = 100;
%% generate experimental outcomes
for i = 1 : maxNum
H(i) = binornd(1, 0.4, 1);  % change the probability from 0.5 to (1-0.6) = 0.4
end
%% plot results
i = 1;
for totalNum = 10 : stepSize: maxNum
p(i) = head(totalNum,H);
i = i + 1;
end
plot(10 : stepSize: maxNum, p)
xlabel('number of experiments')
ylabel('probability')
%% function for probability computation
function y = head(totalNum,H)
y = sum(H(1:totalNum))/totalNum;
end
```

3a

```
clear
clc

Maxnum = 10000;
Minnum = 10;
Numdice = 3;
AllRoll = randi(6,[Numdice,Maxnum]);
RollSums = sum(AllRoll,1);

AvgSum = cumsum(RollSums)./(1:Maxnum);
plot(Minnum:Maxnum,AvgSum(Minnum:Maxnum))
xlabel('Number of experiments')
ylabel('Average outcome value')
```

3b

```
clear
clc

Maxnum = 10000;
Minnum = 10;
Numdice = 3;
AllRoll = randi(6,[Numdice,Maxnum]);RollSums = sum(AllRoll,1);
RollSums(RollSums == 9 | RollSums == 10);
AvgSum = cumsum(RollSums)./(1:Maxnum);
plot(Minnum:Maxnum,AvgSum(Minnum:Maxnum))
xlabel('Number of experiments')
ylabel('Average outcome value')
```

3c

```
clear
clc

Maxnum = 10000;
Minnum = 10;
Numdice = 3;
AllRoll = randsrc(3, 10000,[1 2 3 4 5 6;0 0.1 0.15 0.2 0.25 0.3]);
RollSums = sum(AllRoll,1);
AvgSum = cumsum(RollSums)./(1:Maxnum);
plot(Minnum:Maxnum,AvgSum(Minnum:Maxnum))
xlabel('Number of experiments')
ylabel('Average outcome value')
```

4a

```
studentno = 57140216;
N=100;                      %sequence length is 100
rand('state',studentno);    %initialized with your ID
u=4*rand([1,N])-1;

figure
plot(u)
```

4b

```
clear
clc

studentno = 57140216;
N=100;
rand('state',studentno);
u=4*rand([1,N])-1;
w = u.^2;

samplemean = 1/N * sum(u,'all');
power = 1/N * sum(w,'all');
v = (u - samplemean).^2;
variance = 1/N * sum(v,'all');
```

4c

```
clear
clc

studentno = 57140216;
N=100000;
rand('state',studentno);
u=4*rand([1,N])-1;
w = u.^2;

samplemean = 1/N * sum(u,'all');
power = 1/N * sum(w,'all');
v = (u - samplemean).^2;
variance = 1/N * sum(v,'all');
```

4e&4f

```
clear
clc

studentno = 57140216;
N=100000;
rand('state',studentno);
u=4*rand([1,N])-1;
w = u.^2;
V = u.^3;
mu = 0;
sigma = 1;
pd = makedist('Normal');

samplemean = 1/N * sum(u,'all');
power = 1/N * sum(w,'all');
v = (u - samplemean).^2;
variance = 1/N * sum(v,'all');

histogram(V);
Vmean = mean(V);
PD = pdf(pd, V);
plot(V, PD);
```

5a

```
clear
clc

studentno = 57140216;
rand('state', studentno);
N = 100;
V = rand(1, N);
X = zeros(1, N);

for i = 1:N
    if V(i) < 0.3
        X(i) = 1;
    else
        X(i) = 0;
    end
end

[f, x] = hist(X, unique(X));
p = f / N;
bar(x,p);
```

5b

```
clear
clc

studentno = 57140216;
rand('state', studentno);
N = 100000;
V = rand(1, N);
X = zeros(1, N);

for i = 1:N
    if V(i) < 0.3
        X(i) = 1;
    else
        X(i) = 0;
    end
end

[f, x] = hist(X, unique(X));
p = f / N;
bar(x,p);
```

5c

```
clear
clc

studentno = 57140216;
rand('state', studentno);
N = 100000;
p = 0.3;
n = 4;
V = rand(n, N); % It creates the a n X N matrix that its value is from 0 to 1
W = sum(V < p, 1);
%It sums up the probability of getting 0, 1, 2, 3, 4 successes in four
%trial with p = 0.3

[f, x] = hist(W, unique(W)); % It creates a histogram distribution of W and its↙
unique value
% f is the counts and x is the centers, and it adds additional row vector,
% x to indicate the location of each bin center on the x-axis.
p = f / N; % Since f is the counts, so to divide it by total number N
% To get the p which is the probability of success
bar(x, p); % Finally to plot it in bar diagram
```