Code 1:

```
clear all
close all
clc
f=@(x)exp(-2*x)

%7.1.3
T = 10000;
lambda = 2;

U = rand(T, 1); % generation of uniform R.V.}
Y = ( - 1 / lambda) * log(1 - U);

mean(Y)
var(Y)

plot(Y)

%7.1.4
figure(1)
z = histogram(Y,'Normalization','probability')
ccdf=zeros(length(z.Values), 1);
error=zeros(length(z.Values),1);

xaxis=zeros(length(z.Values),1);
for i=1:length(z.Values)
   xaxis(i,1)=(z.BinEdges(i)+z.BinEdges(i+1))/2
end
for i=1:length(z.Values)
   ccdf(i, 1) = sum(z.Values(i:end));
end
figure(2)
plot(xaxis,ccdf)



for i=1:length(z.Values)
   error(i,1) = ccdf(i,1)-f((z.BinEdges(i)+z.BinEdges(i+1))/2)

end
figure(3)
plot(xaxis,error)
errorsum=0;
```

```
for i=1:length(error)

   errorsum=errorsum+error(i)*(z.BinEdges(i+1)-z.BinEdges(i));
end
display(errorsum)
```

Code 2:

```
lambda=2;
meani=zeros(5000);
variancei=zeros(5000);
errormeani=zeros(5000);
errorvariancei=zeros(5000);
for i=1:5000

   U = rand(i, 1); % generation of uniform R.V.}
   Y = ( - 1 / lambda) * log(1 - U);

   meani(i)=mean(Y);
   variancei(i)=var(Y);
end
for i=1:5000



   errormeani(i)=meani(i)-0.5;
   errorvariancei(i)=variancei(i)-0.25;
end

figure(1)
plot(meani)
figure(2)
plot(variancei)
figure(3)
plot(errormeani)
figure(4)
plot(errorvariancei)
```

Code 3:

```
errorsume=zeros(100,1);
for i=1:100
   errorsume(i,1)=errorsum(i*10000,2);
end
```

```
figure(5)
plot(errorsume)

errorsume=zeros(5000,1);
for i=1:5000
   errorsume(i,1)=errorsum(i,2);
end
figure(6)
plot(errorsume 2)
```

Code 4:

```
function errorsum1 = errorsum(T,lambda)

f=@(x)exp(-lambda*x);

%7.1.3


U = rand(T, 1); % generation of uniform R.V.}
Y = ( - 1 / lambda) * log(1 - U);

z = histogram(Y,'Normalization','probability');
ccdf=zeros(length(z.Values), 1);
error=zeros(length(z.Values),1);

xaxis=zeros(length(z.Values),1);
for i=1:length(z.Values)
   xaxis(i,1)=(z.BinEdges(i)+z.BinEdges(i+1))/2;
end
for i=1:length(z.Values)
   ccdf(i, 1) = sum(z.Values(i:end));
end
%plot(xaxis,ccdf);
for i=1:length(z.Values)
   error(i,1) = ccdf(i,1)-f((z.BinEdges(i)+z.BinEdges(i+1))/2);

end
%plot(xaxis,error)
errorsum1=0;
for i=1:length(z.Values)

   errorsum1=errorsum1+error(i,1)*(z.BinEdges(i+1)-z.BinEdges(i));
End
```

Figure of error

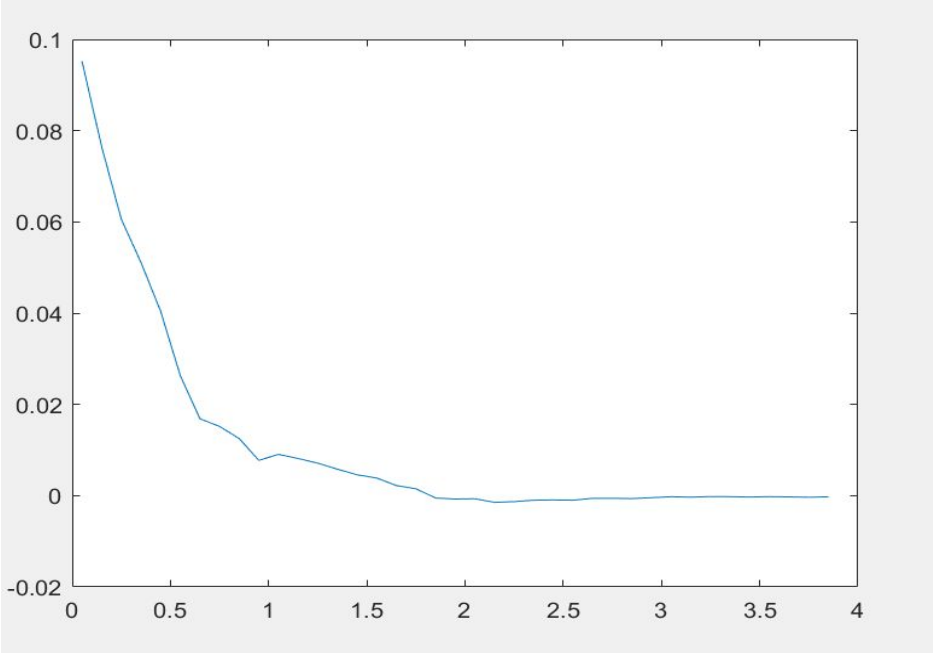


Figure of Histogram

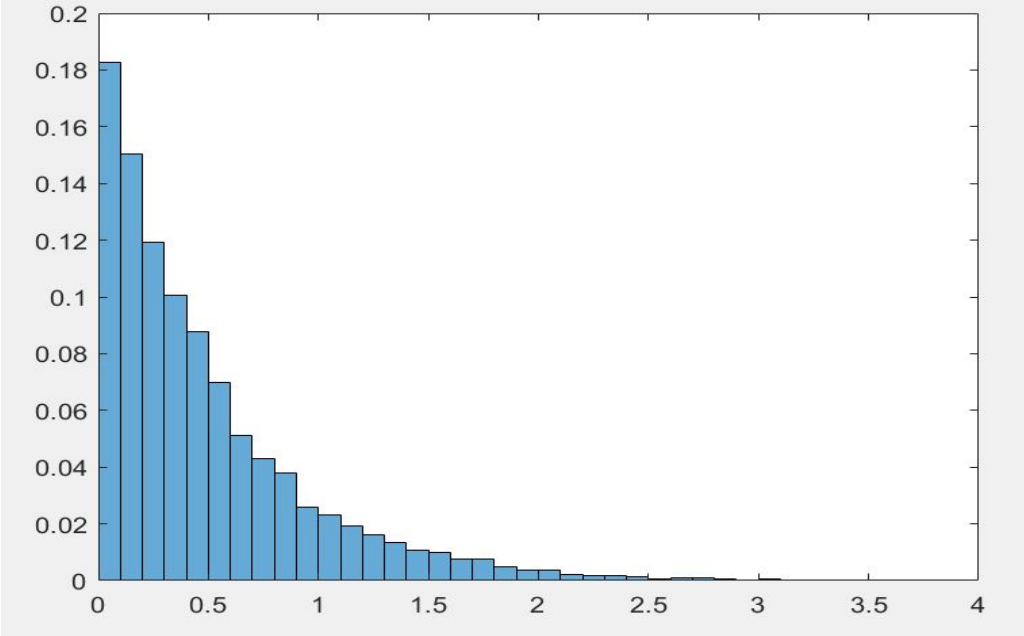
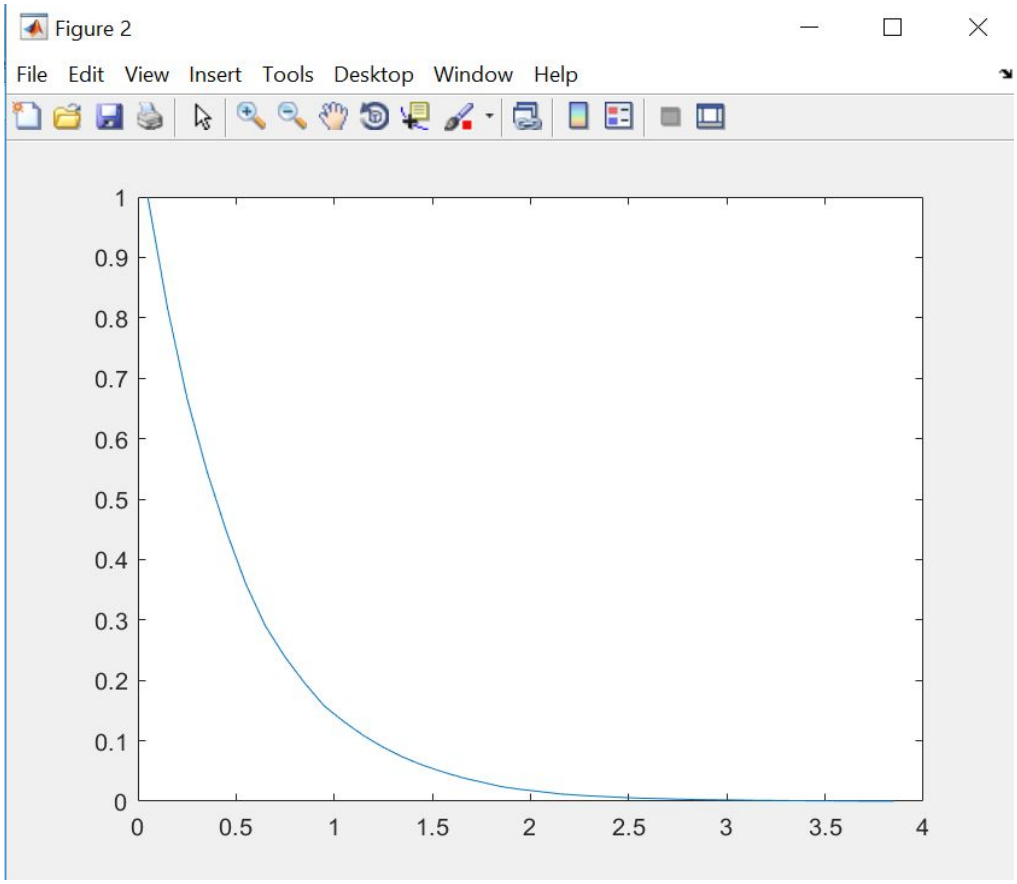
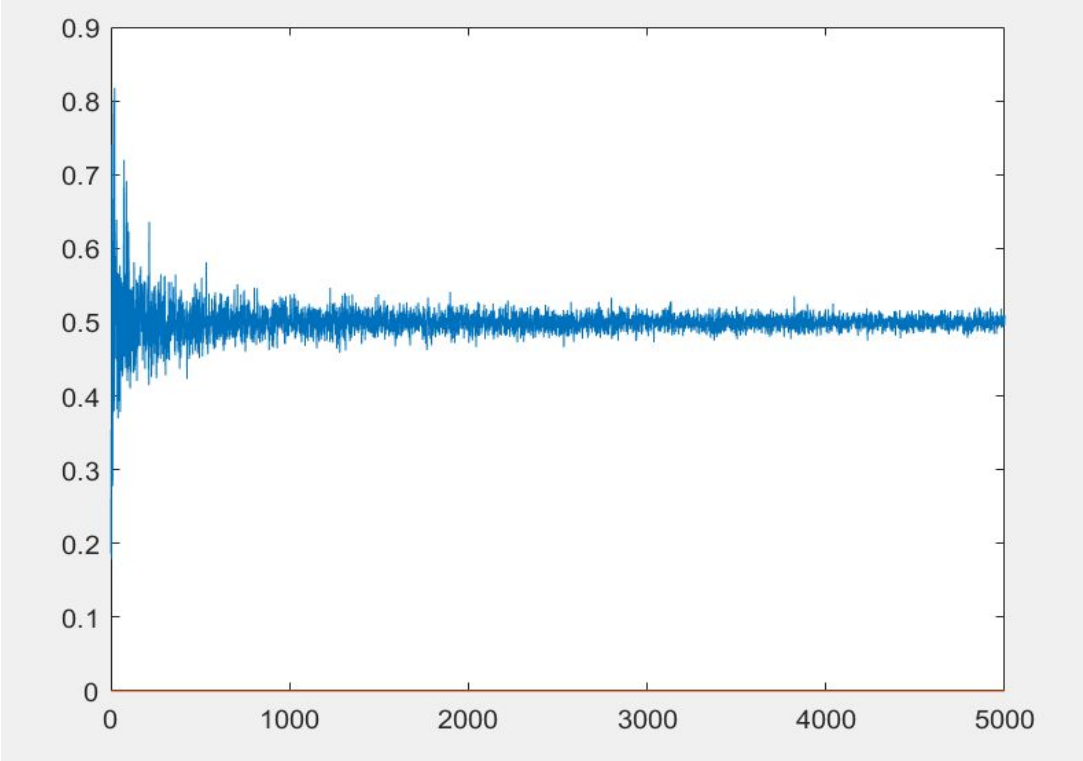


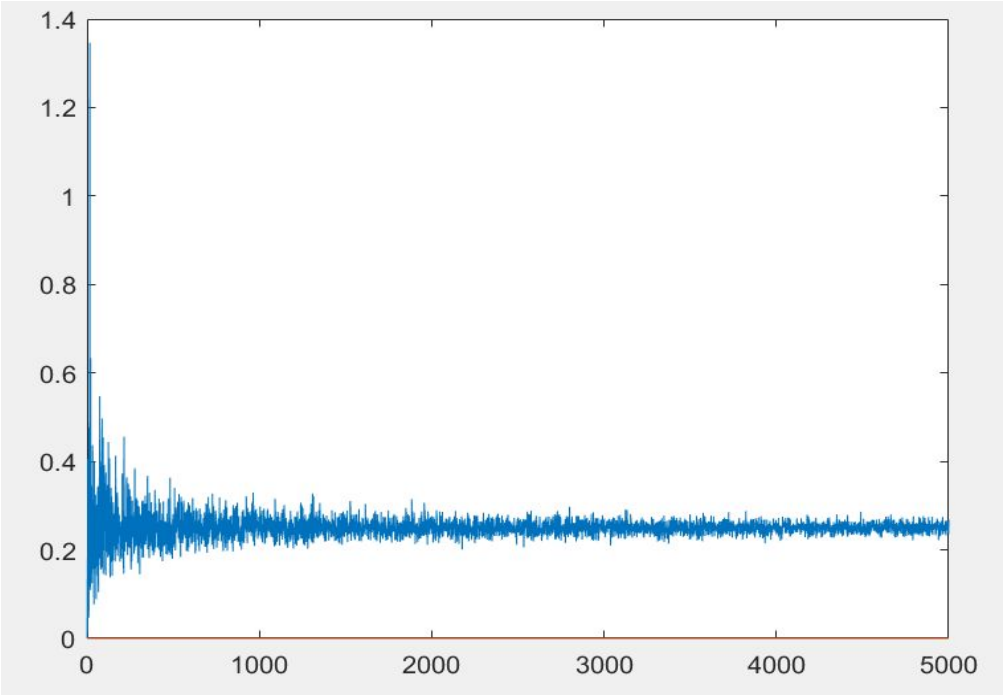
Figure of our ccdf



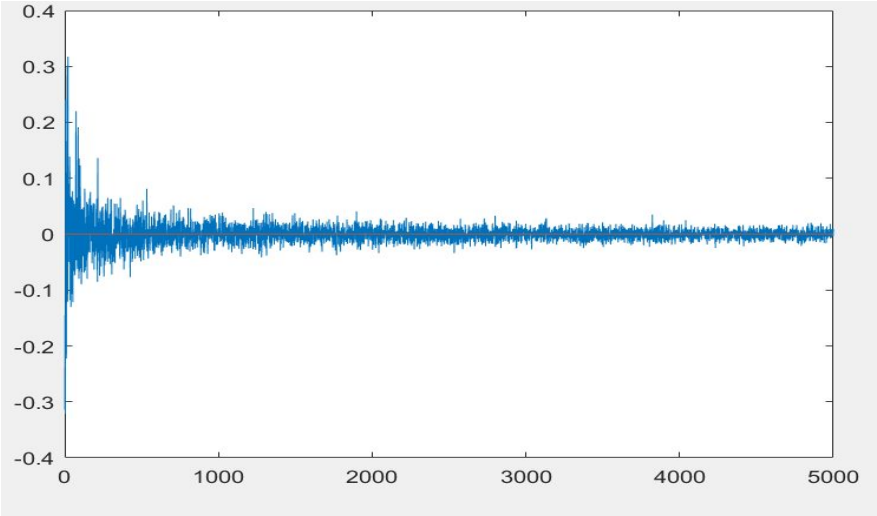
Graph of mean versus no of samples



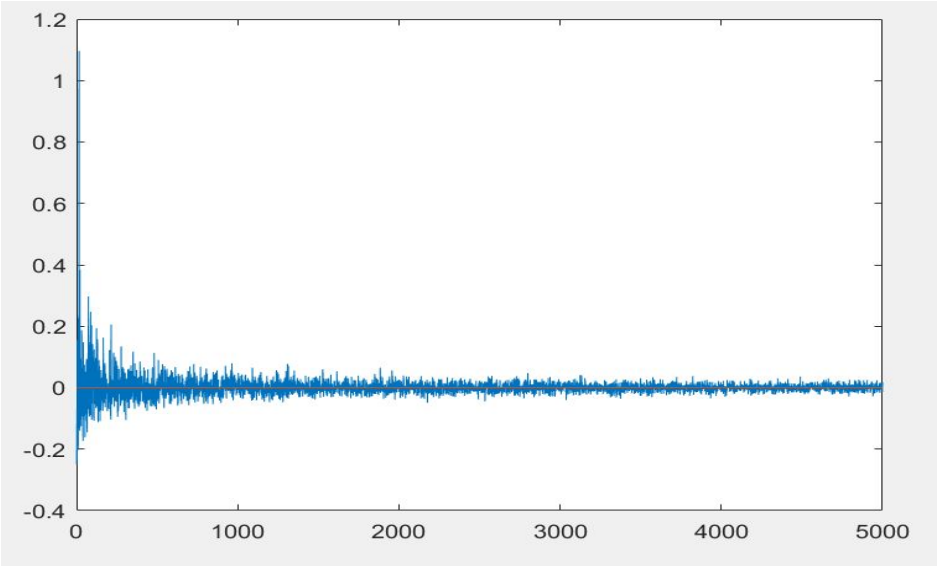
Graph of variance versus no of samples



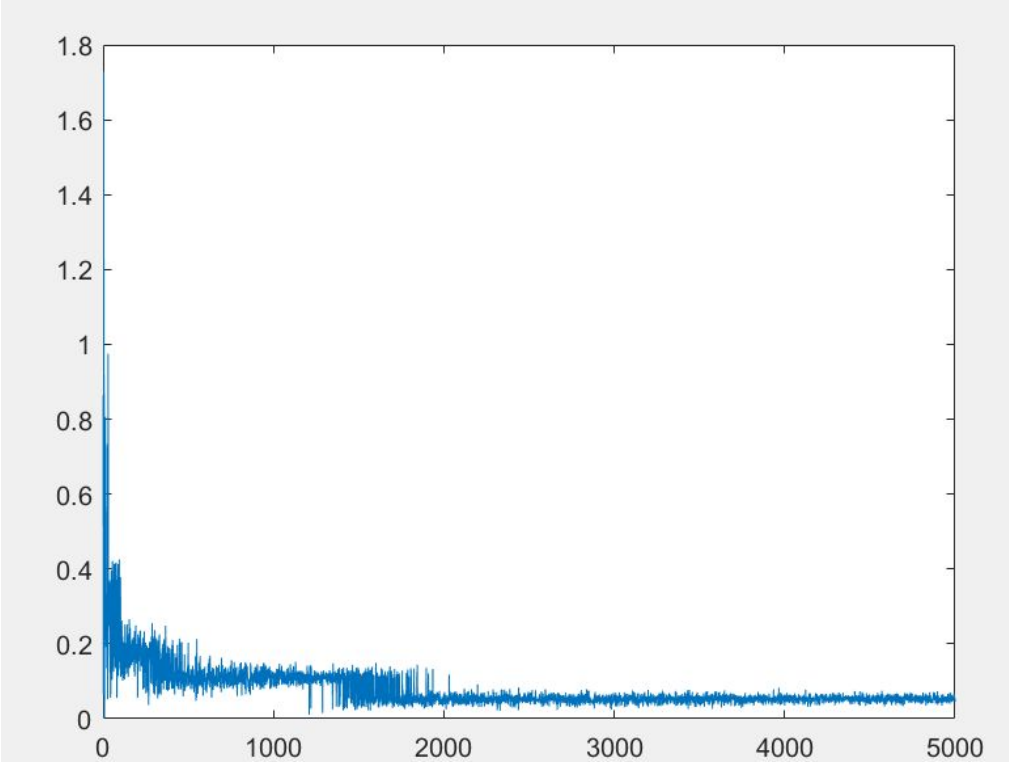
Graph of error in mean

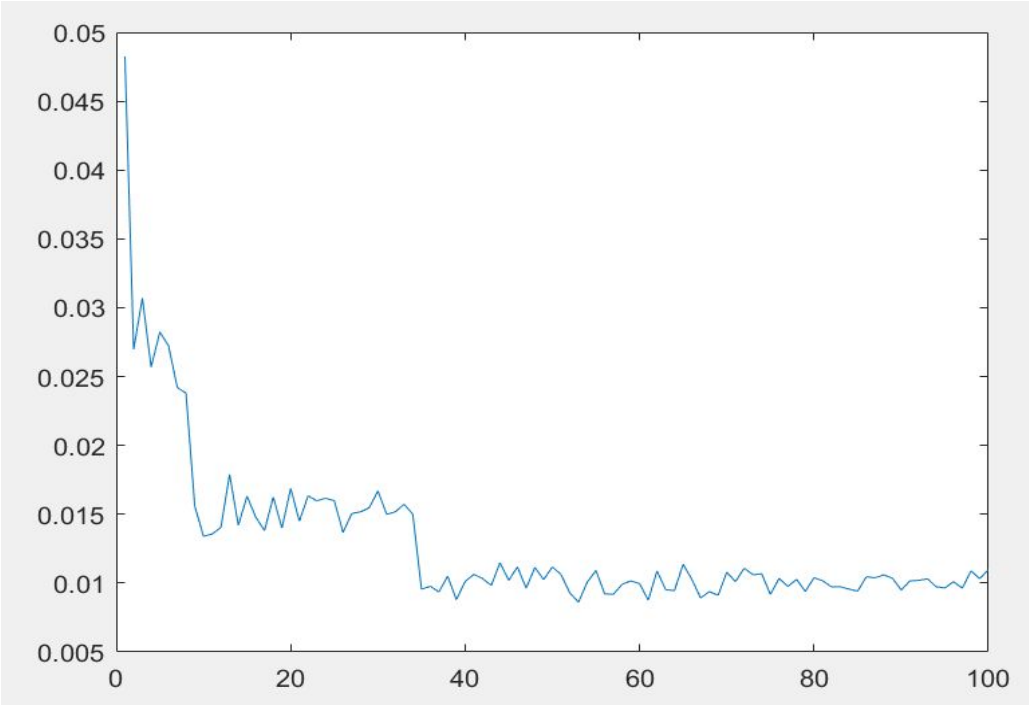


Graph of error in variance



Graph of errorsum versus number of samples


1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
1000
2000
3000
4000
5000


0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
20
40
60
80
100