1.2

```
a=[1 2 3];
c=a.*a
```

```
c = 1×3
     1     4     9
```

```
d=sin(5*c.^2)
```

```
d = 1×3
   -0.9589   -0.9939    0.2623
```

1.3.1

1.3.1 Analytical Calculation

Compute these two integrals. Do the computation manually.

1.

$$\int_0^{2\pi} (\sin 5t)^2 \, dt$$

2.

$$\int_0^1 e^t \, dt$$

INLAB REPORT: Hand in your calculations of these two integrals. Show all work.

```
clc,clear,close all
syms t
y=sin(5*t.^2)
```

```
y = sin(5 t^2)
```

```
Sy=int(y,t,0,2*pi)
```

```
Sy =
```

$$\frac{\sqrt{10}\ \sqrt{\pi}\ \mathrm{S}(2\ \sqrt{10}\ \sqrt{\pi})}{10}$$

```
Z=exp(t)
```

```
Z = e^t
```

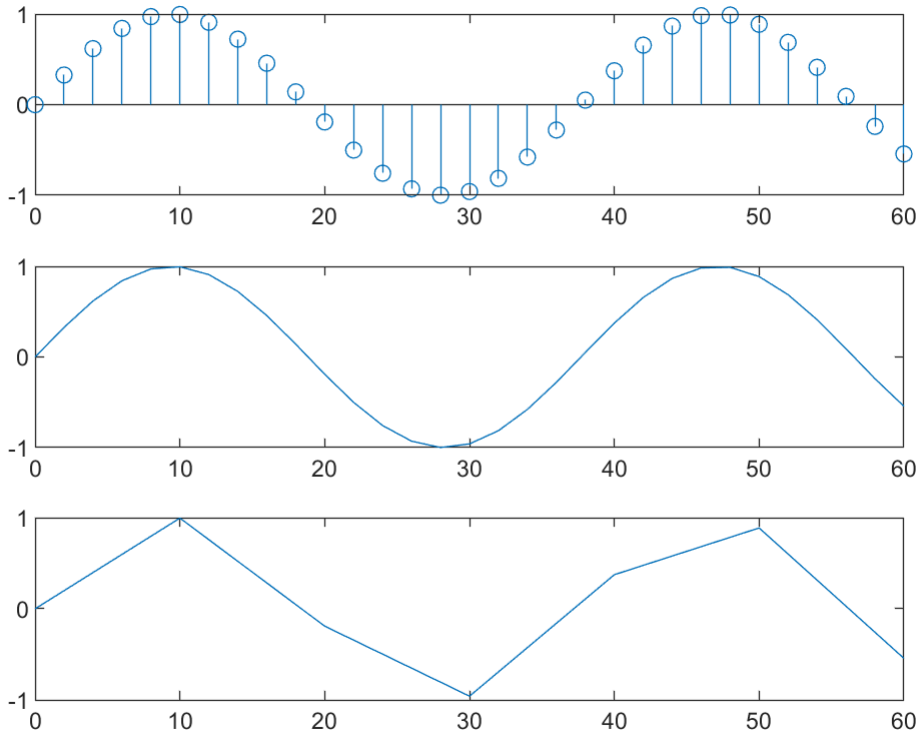
```
Sz=int(Z,t,0,1)
```

```
Sz = e - 1
```

1.3.2

```
clc,clear,close all
n1=0:2:60;
y=sin(n1/6);
subplot(3,1,1)
stem(n1,y)
```

```
n1=0:2:60;
z=sin(n1/6);
subplot(3,1,2)
plot(n1,z)

n2=0:10:60;
w=sin(n2/6);
subplot(3,1,3)
plot(n2,w)
```



1.3.3

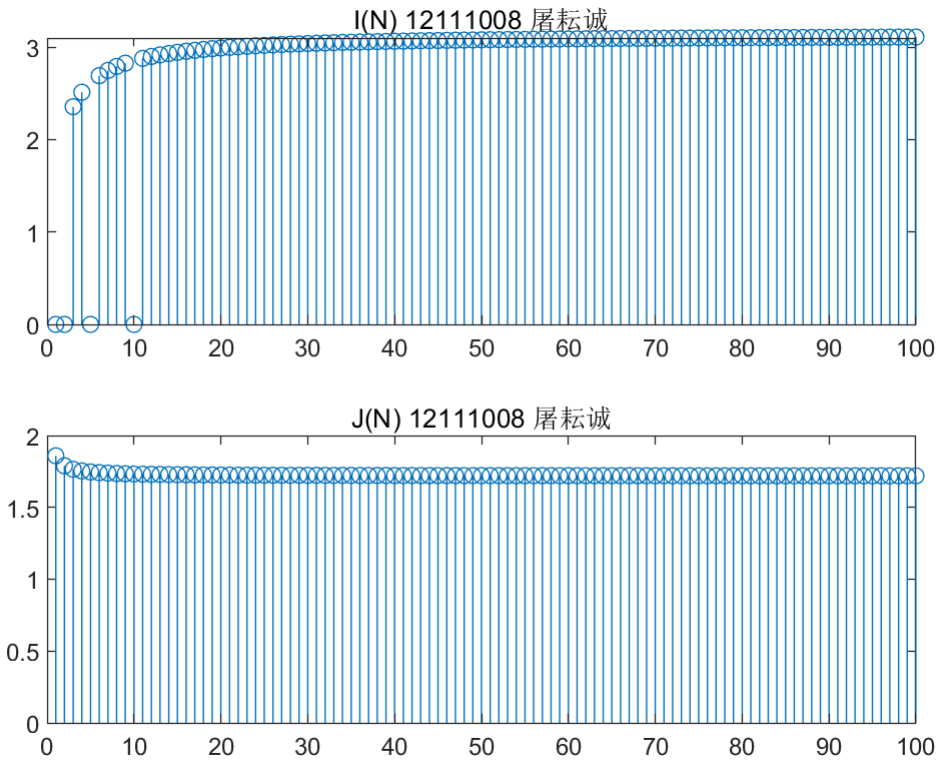
```
clear
N=100;
n1=1:N;
I=loopI(N);
```

```
I = 4.7116e-30
I = 3.9264e-30
I = 2.3562
I = 2.5133
I = 3.4552e-30
I = 2.6928
I = 2.7489
I = 2.7925
I = 2.8274
I = 3.2981e-30
I = 2.8798
I = 2.8999
I = 2.9172
```

I = 2.9322
I = 2.9452
I = 2.9568
I = 2.9671
I = 2.9762
I = 2.9845
I = 2.9920
I = 2.9988
I = 3.0050
I = 3.0107
I = 3.0159
I = 3.0208
I = 3.0252
I = 3.0294
I = 3.0333
I = 3.0369
I = 3.0403
I = 3.0434
I = 3.0464
I = 3.0492
I = 3.0518
I = 3.0543
I = 3.0567
I = 3.0589
I = 3.0610
I = 3.0631
I = 3.0650
I = 3.0668
I = 3.0685
I = 3.0702
I = 3.0718
I = 3.0733
I = 3.0748
I = 3.0761
I = 3.0775
I = 3.0788
I = 3.0800
I = 3.0812
I = 3.0823
I = 3.0834
I = 3.0845
I = 3.0855
I = 3.0865
I = 3.0874
I = 3.0883
I = 3.0892
I = 3.0901
I = 3.0909
I = 3.0917
I = 3.0925
I = 3.0933
I = 3.0940
I = 3.0947
I = 3.0954
I = 3.0961
I = 3.0967
I = 3.0973
I = 3.0980
I = 3.0986
I = 3.0991
I = 3.0997
I = 3.1003
I = 3.1008
I = 3.1013
I = 3.1018

```
I = 3.1023
I = 3.1028
I = 3.1033
I = 3.1037
I = 3.1042
I = 3.1046
I = 3.1051
I = 3.1055
I = 3.1059
I = 3.1063
I = 3.1067
I = 3.1071
I = 3.1074
I = 3.1078
I = 3.1082
I = 3.1085
I = 3.1089
I = 3.1092
I = 3.1095
I = 3.1099
I = 3.1102
I = 3.1105
```

```
J=J(N);
figure
subplot(2,1,1)
stem(n1,I),title('I(N) 12111008 屠耘诚')
subplot(2,1,2)
stem(n1,J),title('J(N) 12111008 屠耘诚')
```



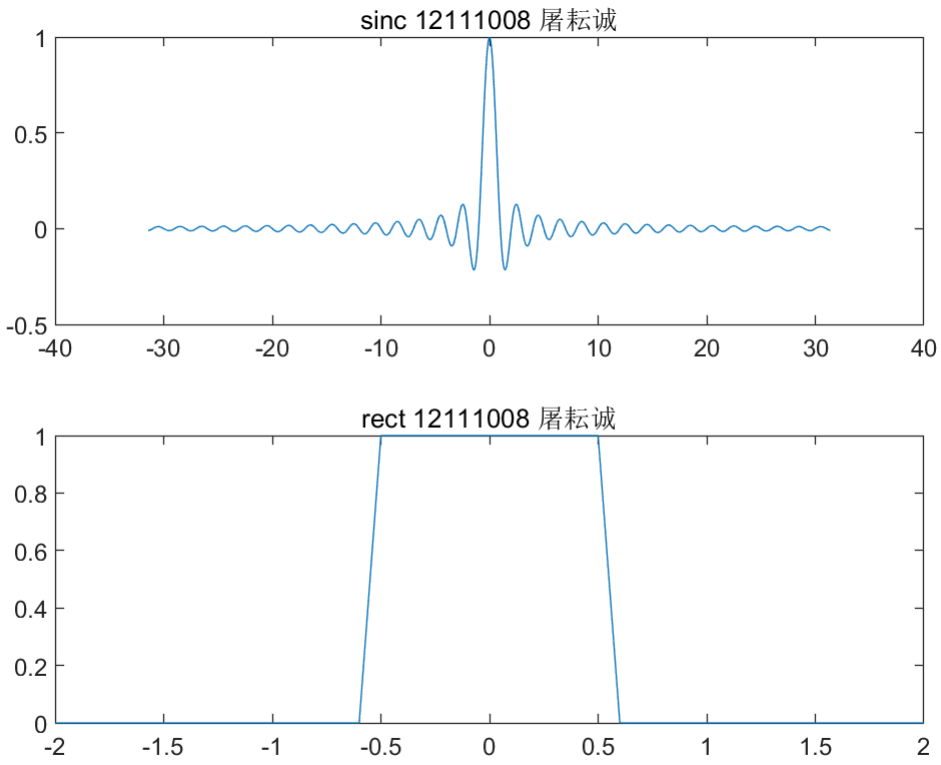
可以看见I(5)=I（10）=0

1.4

1.5

- sinc (t) for t in $[-10\pi, 10\pi]$
- rect (t) for t in $[-2, 2]$

```
t1=-10*pi:0.1:10*pi;
t2=-2:0.1:2;
sinc=sinc(t1);
rect=(abs(t2)<=0.5);%方波函数

figure
subplot(2,1,1)
plot(t1,sinc),title('sinc 12111008 屠耘诚')
subplot(2,1,2)
plot(t2,rect),title('rect 12111008 屠耘诚')
```



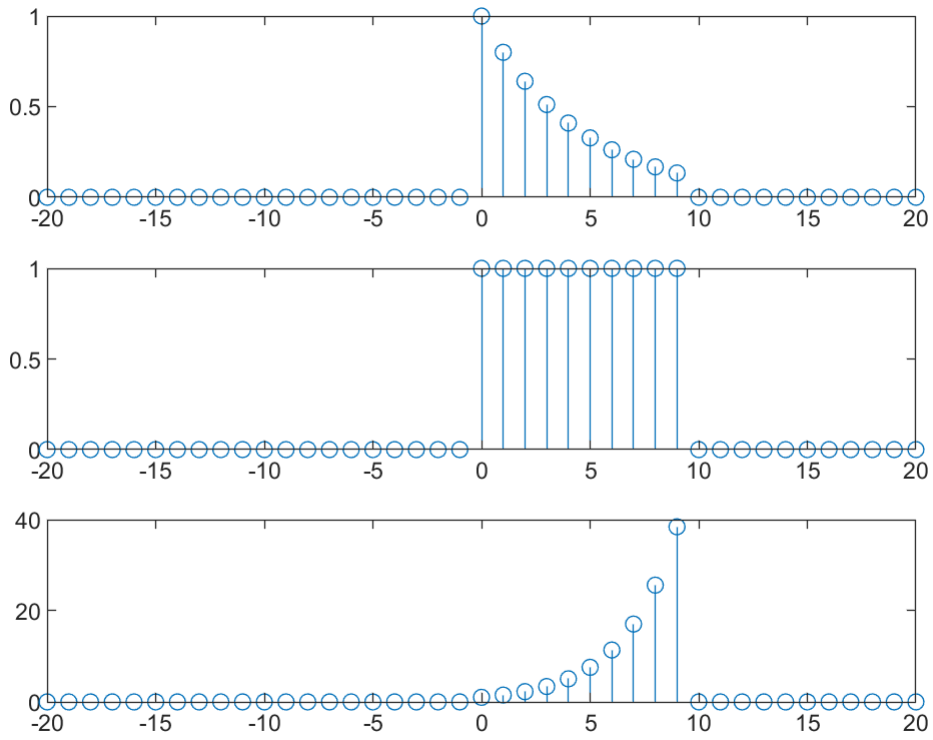
- $a^n\,(u\,[n] - u\,[n-10])$ for n in $[-20, 20]$

Repeat this procedure for the function

- $\cos(\omega n)\,a^n\,u[n]$ for $\omega = \pi/4$, and n in $[-1, 10]$

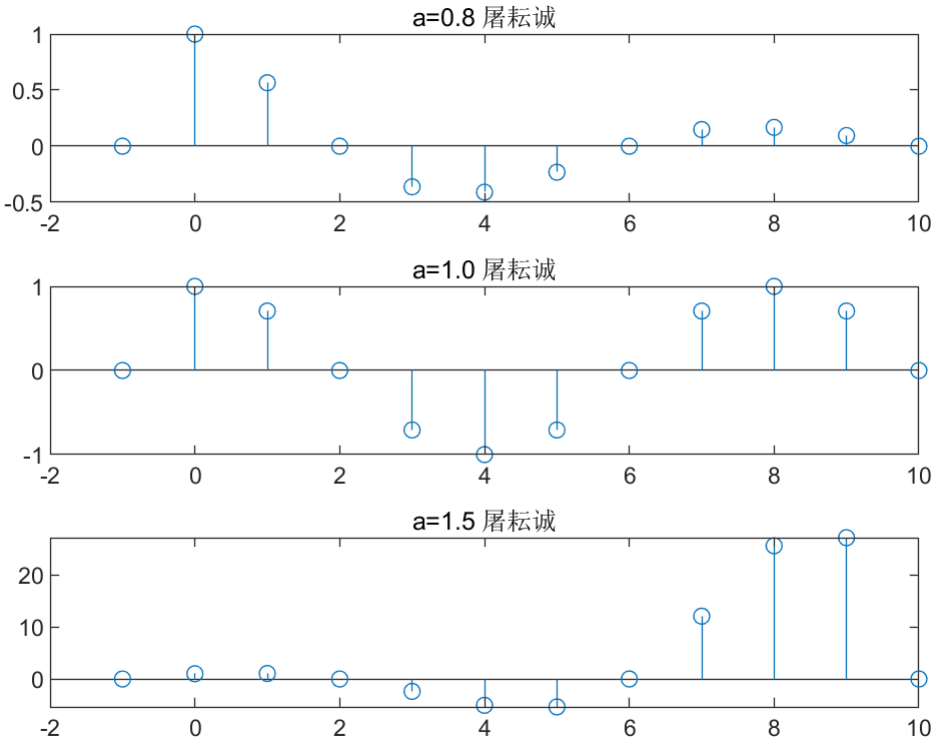
```
clear
n1=-20:20;
```

```
y=(n1>=0)-(n1>=10);
%a=0.8
a1=0.8;
y1=a1.^n1.*y;
%a=1.0
a2=1;
y2=a2.^n1.*y;
%a=1.5
a3=1.5;
y3=a3.^n1.*y;
figure
subplot(3,1,1),title('a=0.8 屠耘诚')
stem(n1,y1)
subplot(3,1,2),title('a=1.0 屠耘诚')
stem(n1,y2)
subplot(3,1,3),title('a=1.5 屠耘诚')
stem(n1,y3)
```




```
n2=-1:10;
w=pi/4;
y=(n2>=0);

a1=0.8;
y1=cos(w*n2).*(a1.^n2).*y;

a2=1;
```

```
y2=cos(w*n2).*(a2.^n2).*y;

a3=1.5;
y3=cos(w*n2).*(a3.^n2).*y;
figure
subplot(3,1,1)
stem(n2,y1),title('a=0.8 屠耘诚')
subplot(3,1,2)
stem(n2,y2),title('a=1.0 屠耘诚')
subplot(3,1,3)
stem(n2,y3),title('a=1.5 屠耘诚')
```

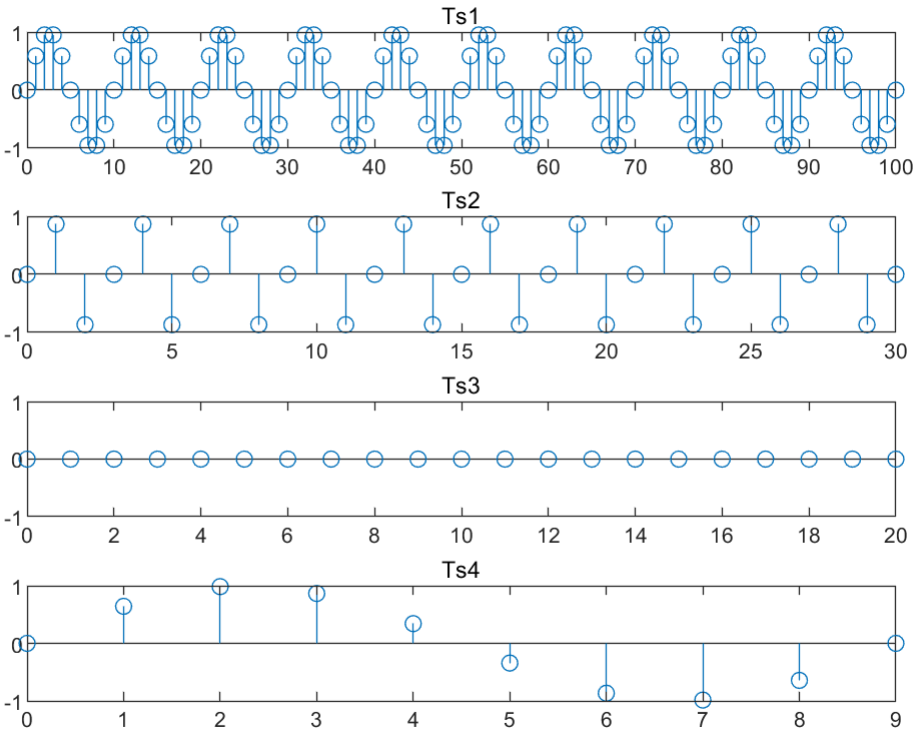


1.6

1. $T_s = 1/10$, $0 \le n \le 100$; axis([0,100,−1,1])
2. $T_s = 1/3$, $0 \le n \le 30$; axis([0,30,−1,1])
3. $T_s = 1/2$, $0 \le n \le 20$; axis([0,20,−1,1])
4. $T_s = 10/9$, $0 \le n \le 9$; axis([0,9,−1,1])

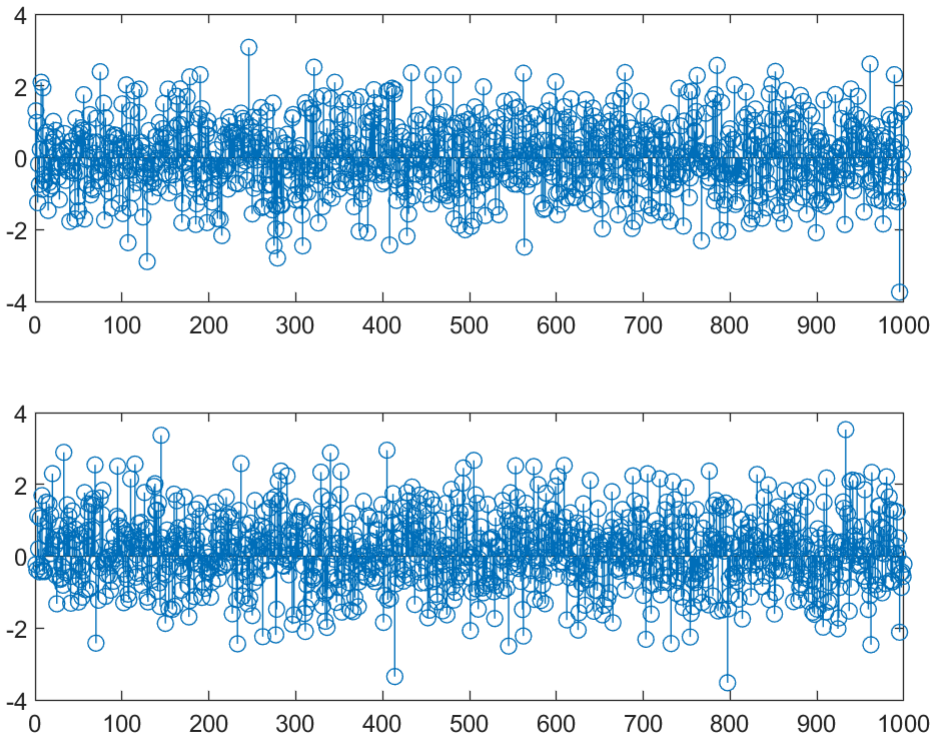
```
Ts1=1/10;
Ts2=1/3;
Ts3=1/2;
Ts4=10/9;

f=@(x) sin(2*pi*x);

n1=0:100;
n2=0:30;
n3=0:20;
n4=0:9;
```

```
f1=f(Ts1*n1);
f2=f(Ts2*n2);
f3=f(Ts3*n3);
f4=f(Ts4*n4);

figure
subplot(4,1,1),stem(n1,f1),axis([0,100,-1,1]),title('Ts1')
subplot(4,1,2),stem(n2,f2),axis([0,30,-1,1]),title('Ts2')
subplot(4,1,3),stem(n3,f3),axis([0,20,-1,1]),title('Ts3')
subplot(4,1,4),stem(n4,f4),axis([0,9,-1,1]),title('Ts4')
```

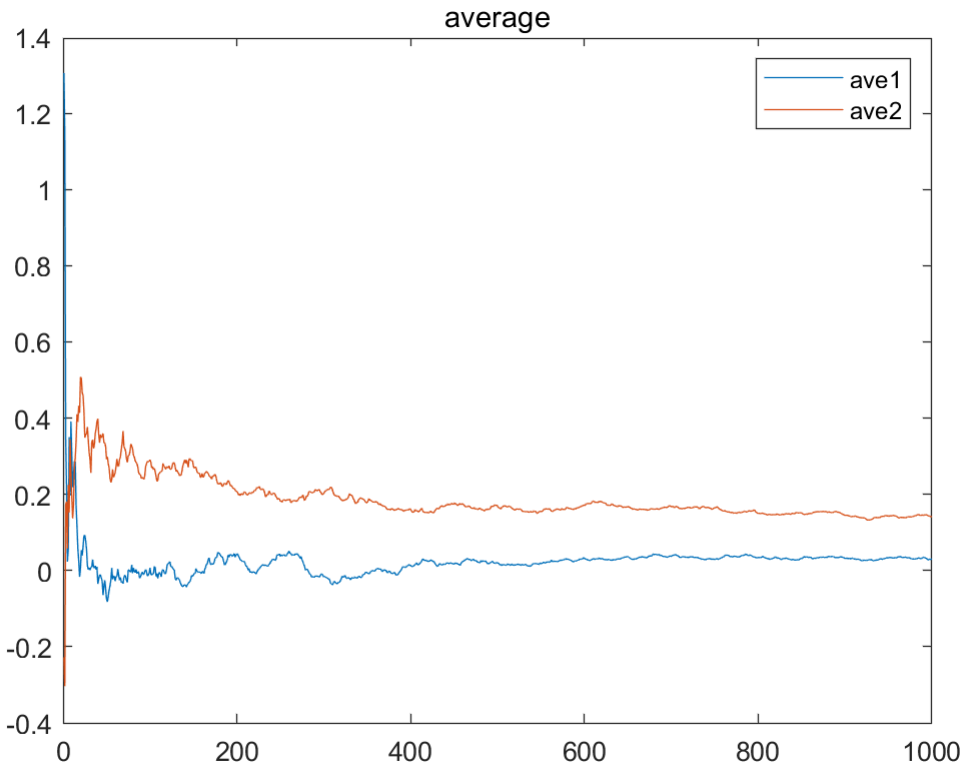


1.7

```
clear
sig1=randn(1,1000);% Gaussian random variables with mean 0 and variance 1
sig2=0.2+randn(1,1000);%Gaussian random variables with mean 0.2 and variance 1

figure
subplot(2,1,1),stem(sig1)
subplot(2,1,2),stem(sig2)
```




```
ave1=zeros(1,1000);
ave2=zeros(1,1000);
n=1:1000;

for i=1:1000
    ave1(i)=mean(sig1(1:i));
    ave2(i)=mean(sig2(1:i));
end

figure
plot(n,ave1,n,ave2),title('average')
legend('ave1','ave2')
```


average
ave1
ave2
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
0
200
400
600
800
1000