task1.m | task2.m | task3.m | +

```
clc
clear all
close all


n=4; % number of realizations
A0=10; % starting number of molecules
% A=A0; % store the A
detat=0.01; % time step
k=0.5;  % rate constant

figure
hold on
for i=1:n
    A=A0; % store the A
    j=1;
    while A(j)>0
        r=rand();
        if r<A(end)*k*detat
            A(j+1)=A(j)-1;
        else
            A(j+1)=A(j);
        end
        j=j+1;
    end
    plot(0:detat:(j-1)*detat,A)
    xlabel('t')
    ylabel('A(t)')
end

```

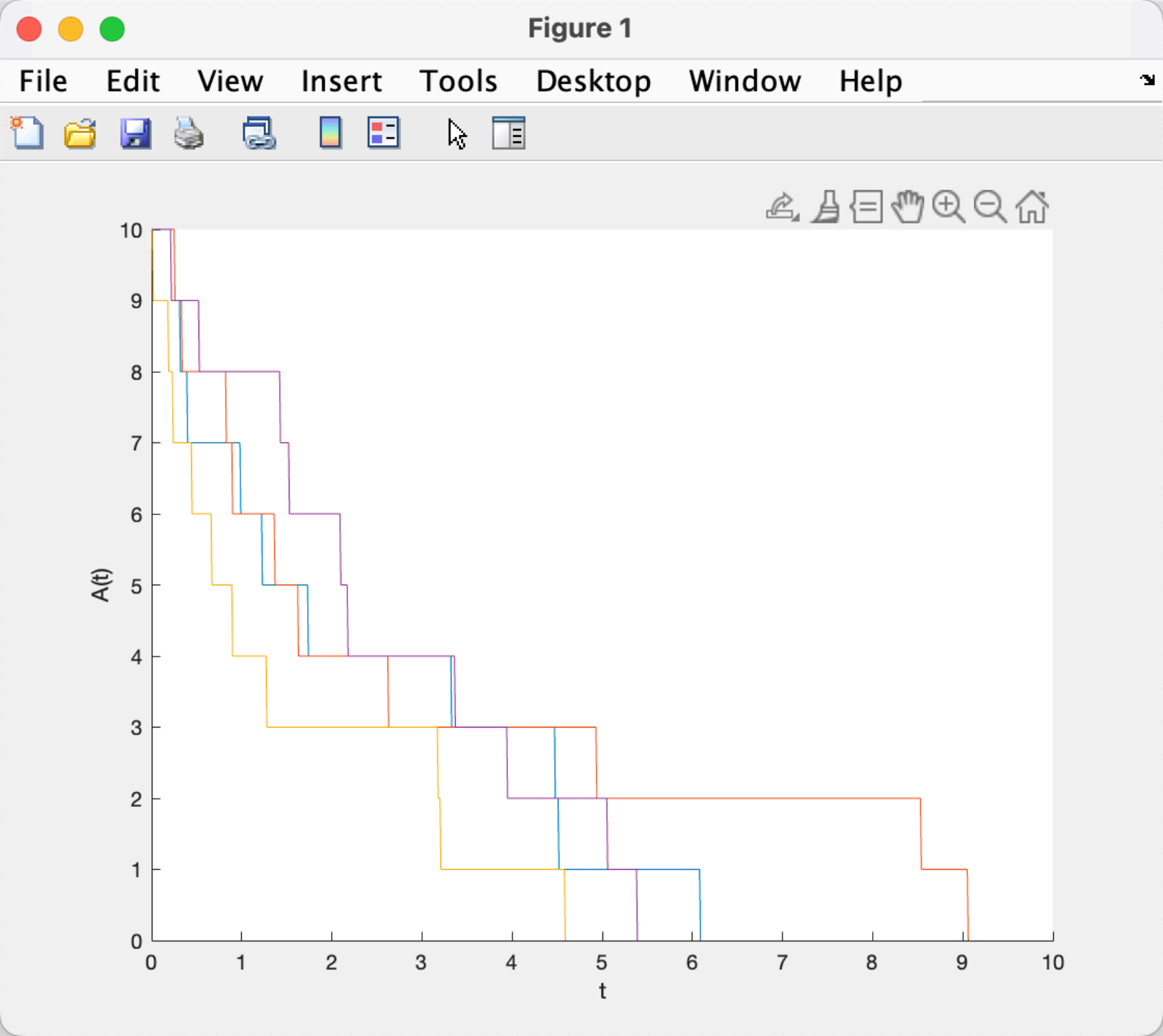
Figure 1
File Edit View Insert Tools Desktop Window Help
A(t)
t
0 1 2 3 4 5 6 7 8 9 10

task1.m | task2.m | task3.m

```
clc
clear all
close all


n=10; % number of realizations
A0=10; % starting number of molecules
% A=A0; % store the A
detat=0.01; % time step
k=0.5;  % rate constant
mean_A=zeros(n,1);

figure(1)
subplot(121)
hold on
for i=1:n
    A=A0; % store the A
    j=1;
    while A(j)>0
        r=rand();
        tao=log(1/r)/A(j)/k;
        count=ceil(tao/detat);
        A(j+count)=A(j)-1;
        j=j+count;
    end
    for ii=2:length(A)
        if A(ii)==0
            A(ii)=A(ii-1);
        end
    end
    A(end)=0;
    mean_A(i)=mean(A);
    plot(0:detat:(length(A)-1)*detat,A)
    xlabel('t')
    ylabel('A(t)')
end
subplot(1,2,2)
plot(1:n,mean_A)
xlabel('n')
ylabel('stochastic mean')
```

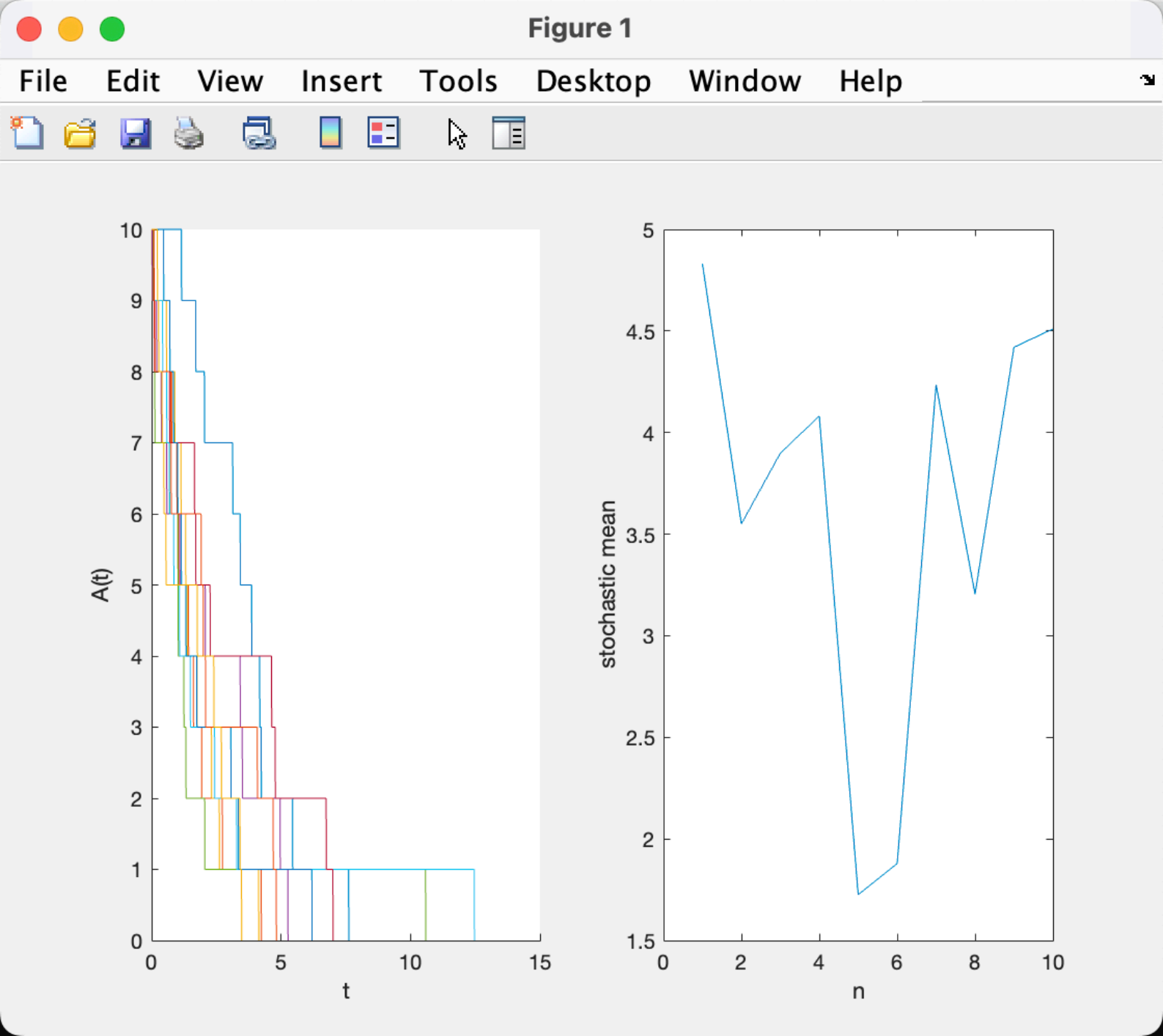
Figure 1
File Edit View Insert Tools Desktop Window Help
A(t)
t
stochastic mean
n

task1.m | task2.m | task3.m

```
clc
clear all
close all


n=100; % number of realizations
A0=10; % starting number of molecules
% A=A0; % store the A
detat=0.01; % time step
k1=0.5;  % rate constant of k1
k2=0.2;  % rate constant of k1
mean_A=zeros(n,1);

figure(1)
subplot(121)
hold on
for i=1:n
    A=A0; % store the A
    j=1;
    while j<=100
        r1=rand();
        r2=rand();
        alpha0=A(j)*k1+k2;
        tao=log(1/r1)/alpha0;
        count=ceil(tao/detat);
        if r2<k2/alpha0
            A(j+count)=A(j)+1;
        else
            A(j+count)=A(j)-1;
        end
        j=j+count;
    end
    for ii=2:length(A)
        if A(ii)==0
            A(ii)=A(ii-1);
        end
    end
    A(end)=0;
    A=A(1:100);  % 100 reactions
    mean_A(i)=mean(A);
%     subplot(3,4,i)
    plot(0:detat:(length(A)-1)*detat,A)
    xlabel('t')
    ylabel('A(t)')
end
subplot(1,2,2)
plot(1:n,mean_A)
xlabel('n')
ylabel('stochastic mean')

```

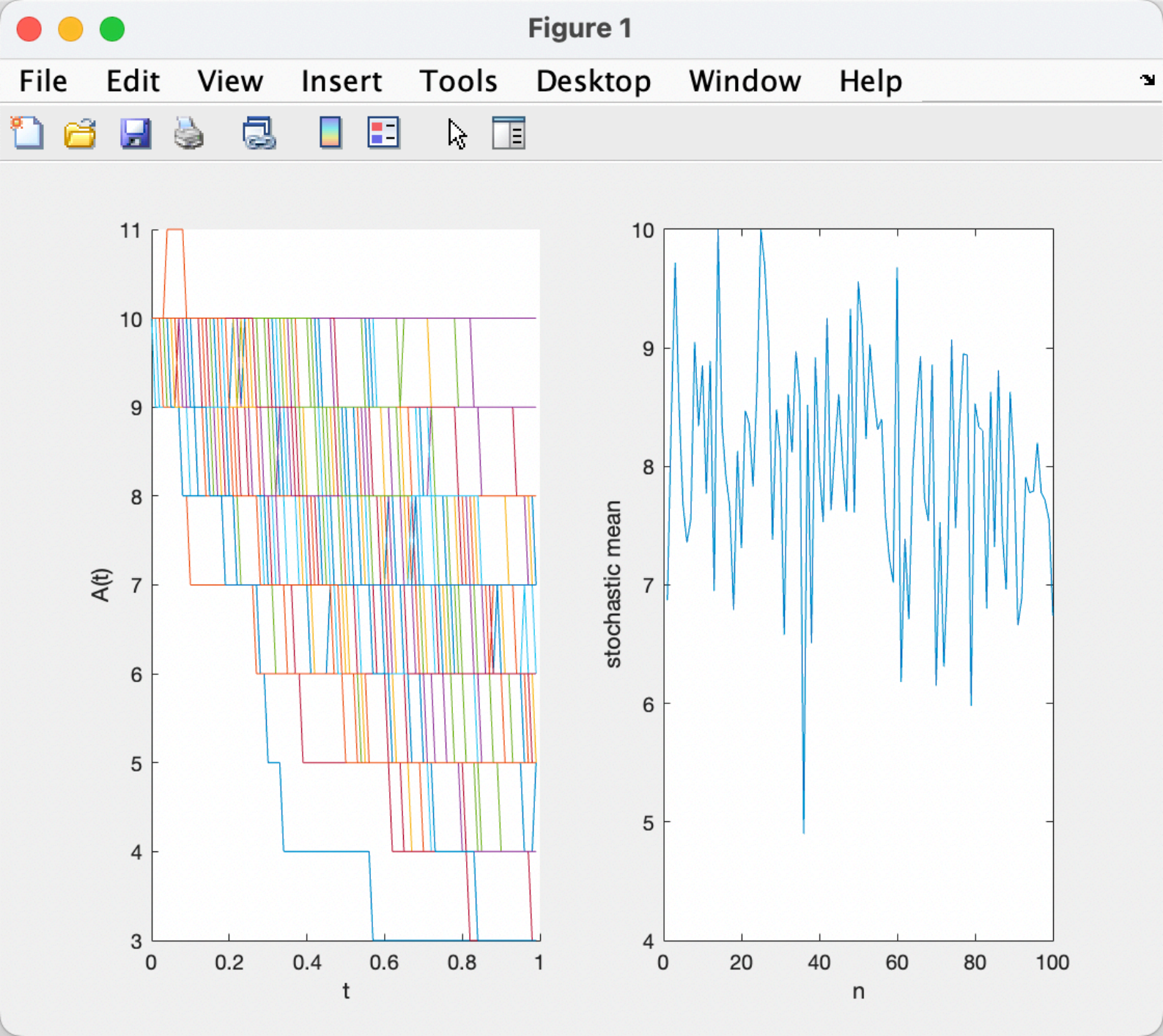
Figure 1
File Edit View Insert Tools Desktop Window Help
A(t)
t
stochastic mean
n