

Exercise pag 16

Slide 1_Sampling

```
beta=10;
n=100;
theshold=2;
nsim=100;
figure
x=[0:0.1:40]';
subplot(2,2,1)
plot(x,exp-pdf(x,beta))
xlabel('x')
ylabel('pdf')
title(['Exp(1/' ,num2str(beta),'')'])

subplot(2,2,2)
plot(x,exp-pdf(x,beta))
hold on
y=exp-pdf(x,beta);
fill([2,x(x>theshold)'],max(x)],[0,y(x>theshold)',0], 'r')
title(['Prob(X>' ,num2str(theshold),'')=' ' num2str(1-
exp-cdf(theshold,beta))])
xlabel('x')
ylabel('pdf')

n1=50;
subplot(2,2,3)
x=exprnd(beta,n1,1);

plot(x,'*')
hold on
line([0 n1],[theshold theshold ],'Color','red')
ylabel('x')
xlabel('sim')
xlim([0 n1])

title(['Freq(X>' ,num2str(theshold),'')=' ' num2str(mean(x>2)), '
nsim=' ,num2str(n1)])

subplot(2,2,4)
x=exprnd(beta,n,1);
plot(x,'*')
hold on
line([0 n],[theshold theshold ],'Color','red')
xlim([0 n])
ylabel('x')
xlabel('sim')
title(['Freq(X>' ,num2str(theshold),'')=' ' num2str(mean(x>2)), '
nsim=' ,num2str(n)])
```

```
%%%%%%%%%
n=10;
```

```
z=zeros(n,nsim);
for i=1:nsim
    z(:,i)=exprnd(beta,n,1);
    z1sum(i,1)=sum(z(:,i)>2);
end;
```

```
figure
for h=1:25
    subplot(5,5,h);
    plot(z(:,h), '*')
    hold on
    line([0 n],[theshold theshold ], 'Color','red')

end;
sgtitle(['X_1>',num2str(theshold),',X_2>',num2str(theshold),',\ldots
,X_n>',num2str(theshold)], 'FontSize',15)
```

```
figure;
count=0;
for h=1:25
    subplot(5,5,h);
    plot(z(:,h), '*')
    hold on
    line([0 n],[theshold theshold ], 'Color','red')
    if z1sum(h,1)==n;
        count=count+1;
        set(gca, 'Color','y')
    end;
end;
```

```
end;
```

```
sgtitle(['Freq(X_1>',num2str(theshold),',X_2>',num2str(theshold),',\
\ldots,X_n>',num2str(theshold),')=' , num2str(count/25), '
Prob(X_1>',num2str(theshold),',X_2>',num2str(theshold),',\ldots,X_n>
',num2str(theshold),')=' , num2str((1-
expcdf(theshold,beta))^n)], 'FontSize',12)
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%sampling distribution
```

```
for i=1:nsim
    zmean(:,i)=mean(z(:,i));
end;
```

```
figure
plot(zmean, '*')
ylim([0 max(zmean)])
hold on
line([0 nsim],[theshold theshold ], 'Color','red')
title('mean')
clearvars -except count
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%variable  $y = I(x > 2)$ 
```

```
beta=10;
n=100;
theshold=2;
nsim=100;
```

```
%%%%%%%%
```

```
%n=10;
```

```
z=zeros(n,nsim);
for i=1:nsim
    z(:,i)=exprnd(beta,n,1);
    y(:,i)=z(:,i)>2;
    sumy(i,1)=sum(y(:,i));
end;
```

```
figure
plot(sumy, '*')
```

```
sgtitle(['sum  $Y_i$ '])
```

```
figure
hist(sumy)
```

```
title(['Distribution of sum  $Y_i$ '])
```