Experiment 6

Aim: To study PDF and CDF functions of different Continuous Random Variables and the effect of parametric changes.

```
clc
clear all
% Uniform Random Variable
fprintf('Uniform Random Variable\n');
a=input('Starting point: ');
b=input('Ending point  : ');
x_u=a-2:0.001:b+2;
inc = x_u(2)-x_u(1);
f_u=zeros(size(x_u));
for i=1:length(x_u)
    if x_u(i)>=a && x_u(i)<=b
        f_u(i)=1/(b-a);
    end
end

F_u=zeros(size(f_u));
for i=1:length(f_u)
    for j=1:i
        F_u(i)=F_u(i)+f_u(j)*inc;
    end
end
m_u=sum(x_u.*f_u)*inc;
var_u=sum(((x_u-m_u).^2).*f_u)*inc;
fprintf('Mean = %3f and Variance =
%3f\n\n',round(m_u,2),round(var_u,2));
figure(2)
subplot(1,2,1)
plot(x_u,f_u,'black')
xlabel('X \rightarrow');
ylabel('f_X(x) \rightarrow');
title('Uniform PDF');
hold on
subplot(1,2,2)
plot(x_u,F_u,'black')
xlabel('X \rightarrow');
ylabel('F_X(x) \rightarrow');
title('Uniform CDF');
ylim([-0.2 1.2]);
hold on

%Gaussian Random Variable
fprintf('Gaussian Random Variable\n');
u= input('Mean of X : ');
var= input('Variance of X : ');
x_g= -10:0.001:10;
inc=x_g(2)-x_g(1);
f_g=(1/sqrt(2*pi*var))*exp(-((x_g-
u).^2)/(2*var));
F_g=zeros(size(f_g));
for i=1:length(f_g)
    for j=1:i
        F_g(i)=F_g(i)+f_g(j)*inc;
    end
end

m_g=sum(x_g.*f_g)*inc;
var_g=sum(((x_g-m_g).^2).*f_g)*inc;
fprintf('Mean = %3f and Variance =
%3f\n\n',round(m_g,2),round(var_g,2));
figure(3)
subplot(1,2,1)
plot(x_g,f_g,'black')
xlabel('X \rightarrow');
ylabel('f_X(x) \rightarrow');
title('Gaussian PDF');
hold on
subplot(1,2,2)
plot(x_g,F_g,'black')
xlabel('X \rightarrow');
ylabel('F_X(x) \rightarrow');
title('Gaussian CDF');
ylim([-0.2 1.2]);
hold on

%Rayleigh Distribution
fprintf('Rayleigh Random Variable\n');
sig=input('Parameter Sigma:');
x_r=0:0.001:10;
inc=x_r(2)-x_r(1);
f_r=(x_r/sig^2).*exp(-
(x_r.^2)/(2*sig^2));
F_r=zeros(size(f_r));
for i=1:length(f_r)
    for j=1:i
        F_r(i)=F_r(i)+f_r(j)*inc;
    end
end

m_r=sum(x_r.*f_r)*inc;
var_r=sum(((x_r-m_r).^2).*f_r)*inc;
fprintf('Mean = %3f and Variance =
%3f\n\n',round(m_r,2),round(var_r,2));
figure(4)
subplot(1,2,1)
plot(x_r,f_r,'black')
xlabel('X \rightarrow');
ylabel('f_X(x) \rightarrow');
title('Rayleigh PDF');
hold on
subplot(1,2,2)
plot(x_r,F_r,'black')
xlabel('X \rightarrow');
ylabel('F_X(x) \rightarrow');
title('Rayleigh CDF');
ylim([-0.2 1.2]);
hold on
```