Experiment 5

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

Code:

```
clc
clear all

%Bernoulli Random Variable
fprintf('Bernoulli Random Variable\n');
q=input('Success Probability : ');
x_be= -3:1:4;
f_be= zeros(size(x_be));
f_be(x_be==1) = q;
f_be(x_be==0) = 1-q;
F_be = zeros(size(f_be));
for i=1:length(x_be)
    for j=1:i
        F_be(i) = F_be(i)+f_be(j);
    end
end
m_be = sum(x_be.*f_be);
var_be= sum(((x_be-m_be).^2).*f_be);
fprintf('Mean = %3f and Variance =
%3f\n\n',round(m_be,2),round(var_be,2));
figure(1);
subplot(3,2,1)
stem(x_be,f_be,'black');
xlabel('X \rightarrow');
ylabel('f_X(x) \rightarrow');
title(['Bernoulli PDF; p=',num2str(q)]);
subplot(3,2,2);
stairs(x_be,F_be,'black');
xlabel('X \rightarrow');
ylabel('F_X(x) \rightarrow');
title(['Bernoulli CDF; p=',num2str(q)]);
ylim([-0.2 1.2]);

%Binomial Random Variable
fprintf('Binomial Random Variable\n');
n=input('Number of incidents: ');
p=input('Success Probability : ');
x_bi= 0:1:n;
f_bi= zeros(size(x_bi));
for k= 0:n

nCk=factorial(n)/(factorial(k)*factorial
(n-k));
    f_bi(k+1)=nCk*p^k*(1-p)^(n-k);
end
F_bi = zeros(size(f_bi));
for i=1:length(x_bi)
    for j=1:i
        F_bi(i) = F_bi(i)+f_bi(j);
    end
end

m_bi = sum(x_bi.*f_bi);
var_bi= sum(((x_bi-m_bi).^2).*f_bi);
fprintf('Mean = %3f and Variance =
%3f\n\n',round(m_bi,2),round(var_bi,2));
figure(1);
subplot(3,2,3)
stem(x_bi,f_bi,'black');
xlabel('X \rightarrow');
ylabel('f_X(x) \rightarrow');
title(['Binomial PDF; n=',num2str(n),'
p=',num2str(p)]);
subplot(3,2,4);
stairs(x_bi,F_bi,'black');
xlabel('X \rightarrow');
ylabel('F_X(x) \rightarrow');
title(['Binomial CDF; n=',num2str(n),'
p=',num2str(p)]);
ylim([-0.2 1.2]);

%Poisson Random Variable
fprintf('Poisson Random Variable\n');
lam = input('Lambda parameter : ');
x_p= 0:1:20;
f_p= zeros(size(x_p));
for k= 0:n

f_p(k+1)=((lam^k)/factorial(k))*exp(-
lam);
end
F_p = zeros(size(f_p));
for i=1:length(x_p)
    for j=1:i
        F_p(i) = F_p(i)+f_p(j);
    end
end
m_p = sum(x_p.*f_p);
var_p= sum(((x_p-m_p).^2).*f_p);
fprintf('Mean = %3f and Variance =
%3f\n\n',round(m_p,2),round(var_p,2));
figure(1);
subplot(3,2,5)
stem(x_p,f_p,'black');
xlabel('X \rightarrow');
ylabel('f_X(x) \rightarrow');
title(['Poisson PDF;
lambda=',num2str(lam)]);
subplot(3,2,6);
stairs(x_p,F_p,'black');
xlabel('X \rightarrow');
ylabel('F_X(x) \rightarrow');
title(['Poisson CDF;
lambda=',num2str(lam)]);
ylim([-0.2 1.2]);
```