clc;

clear;

close all;

n=input("Enter the no of source elements: ");

q=input("Enter the channel matrix P(Y/X)"); %matrix P(Y/X)

disp(q);

disp("");

N=1:n;

p=input("Enter the source probability: ");

%probabilities for X

px=diag(p,n,n);

%matrix P(X)

disp("P(X): ");

disp(px);

disp("");

pxy=px\*q; %P(X,Y)=P(X)\*P(Y|X)

disp("P(X,Y): ");

disp(pxy);

disp("");

py=p\*q; %P(Y)

disp('P(Y): ');

disp(py);

disp("");

%Entropy of

%source h(x)

Hx=0;

for i=1:n

Hx=Hx+(-(p(i)\*log2(p(i))));

end

disp('h(x): ');

disp(Hx);

disp("");

%Entropy of

%destination H(y)

Hy=0;

for i=1:n

Hy=Hy+(-(py(i)\*log2(py(i))));

end

disp('h(y): ');

disp(Hy);

disp("");

% Mutual

%Entropy H(x,y)

hxy=0

for i=1:n

for j=1:n

hxy=hxy+(-pxy(i,j)\*log2(pxy(i,j)));

end

end

disp('H(x,y): ');

disp(hxy);

disp("");

% Conditional

%Entropy H(y/x)

h1=hxy-Hx;

disp('H(x/y): ');

disp(h1);

disp("")

% Conditional

%Entropy H(x/y)

h2=hxy-Hy;

disp('H(y/x): ');

disp(h2);

disp("");

% Mutual

%Information I(x,y)

Ixy=Hx-h2;

disp('I(x,y): ');

disp(Ixy);

disp("");

if h2==0

disp("This Channel is a lossless channel");

end

if Ixy==0

disp("This Channel is a useless channel");

end

if Hx==Hy

if h1==0

disp("This Channel is noiseless channel");

endif

end

**Output**

Enter the no of source elements:

2

Enter the channel matrix P(Y/X)[0.2 0.8;0.3 0.7]

0.2000 0.8000

0.3000 0.7000

Enter the source probability: [0.2 0.8]

P(X):

Diagonal Matrix

0.2000 0

0 0.8000

P(X,Y):

0.040000 0.160000

0.240000 0.560000

P(Y):

0.2800 0.7200

h(x):

0.7219

h(y):

0.8555

hxy = 0

H(x,y):

1.5713

H(x/y):

H(y/x):

I(x,y):

6.0325e-03