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Exp:2

```
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
```

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```
%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("");
```

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```
% 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
```

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```
    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):
```

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0.8555

hxy = 0

H(x,y):

1.5713

H(x/y):

H(y/x):

I(x,y):

6.0325e-03