clc;

clear;

close all;

printf("Name: Jeevesh Wagh\n");

printf("Roll No: 32375\n");

printf("Batch: L8\n");

n = input("Enter the number of source elements: ");

q = input("Enter the channel matrix P(x|Y): ");

disp("Channel matrix P(x|Y):");

disp(q);

disp('');

N = 1:n;

p = input("Enter source probabilities as a vector: ");

px = diag(p, 0); % diag with offset 0, n x n matrix with p on diagonal

disp("P(X):");

disp(px);

disp("");

pxy = px \* q;

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

disp(pxy);

disp("");

Hx = 0;

for i = 1:n

if p(i) > 0 % avoid log2(0)

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

end

end

disp("H(x):");

disp(Hx);

disp("");

py = sum(pxy, 1); % marginal distribution of Y

Hy = 0;

for i = 1:n

if py(i) > 0 % avoid log2(0)

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

end

end

disp("H(y):");

disp(Hy);

disp("");

hxy = 0;

for i = 1:n

for j = 1:n

if pxy(i,j) > 0 % avoid log2(0)

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

end

end

end

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

disp(hxy);

disp("");

h1 = hxy - Hx;

disp("H(y|x):");

disp(h1);

h2 = hxy - Hy;

disp("H(x|y):");

disp(h2);

ixy = Hx - h2;

disp("I(x;y):");

disp(ixy);

if h2 == 0

disp("Lossless channel");

end

if ixy == 0

disp("Useless channel");

end

if Hx == Hy

if h1 == 0

disp("Noiseless channel");

end

end

**OUTPUT**

Name: Jeevesh Wagh

Roll No: 32375

Batch: L8

Enter the number of source elements: 2

Enter the channel matrix P(x|Y): [0.2,0.8;0.3,0.7]

Channel matrix P(x|Y):

0.2000 0.8000

0.3000 0.7000

Enter source probabilities as a vector: [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

H(x):

0.7219

H(y):

0.8555

H(x,y):

1.5713

H(y|x):

0.8494

H(x|y):

0.7159

I(x;y):

6.0325e-03

>>

