Information Theory

Department of Electronics

Assignment # 03 **Submission Date**
May 07, 2010

Q No.1

Given the source distribution$P(X = 1) = q \; and \;\; P(X = 0) = 1 - q$,find the channel capacity for both channels (fig (1.1), fig (1.2)) by choosing the suitable value of p.

Q No.2

Given the source distribution$P(X = 1) = q \; and \;\; P(X = 0) = 1 - q$,

1. Find the channel capacity for both channels (fig (2.1), fig (2.2)).
2. Compare the channel capacity of channel in fig (2.1) with the channel in fig (2.2).
3. Compare the channel capacity of the channels in Q No. 2 with the channels in Q.No.1

Q No.3

Given transition probability of the channel in fig (3.1)

$$P(Y = 1|X = 1) = \alpha \, , P(Y = 0|X = 1) = \beta, P(Y = e|X = 1) = \gamma.$$
$$P(Y = 1|X = 0) = \alpha, P(Y = 0|X = 0) = \beta, P(Y = e|X = 0) = \gamma.$$

1. Find the channel capacity.
2. Compare it with both channels in Q.No.2.

Assume that source is uniformly distributed.

Q No.4

"**Elements of Information Theory**" by Thomas M. Cover & Joy A. Thomas. Ed. 1, Q # 11, Chapter # 08.

Figures of Q No.1

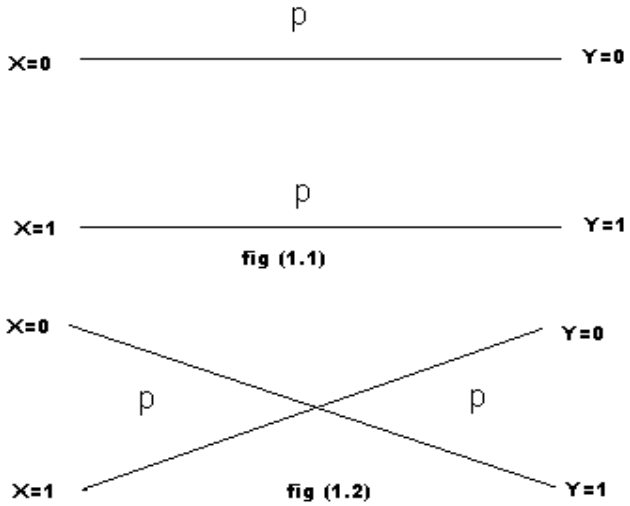

fig (1.1)

fig (1.2)

Figures of Q No.2

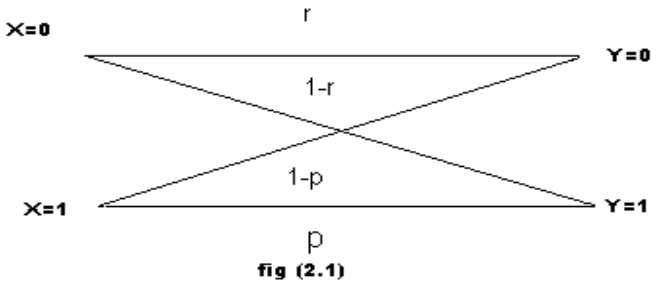

fig (2.1)

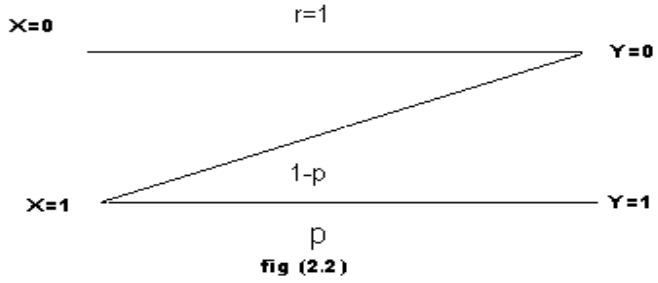

fig (2.2)

Figure of Q No.3

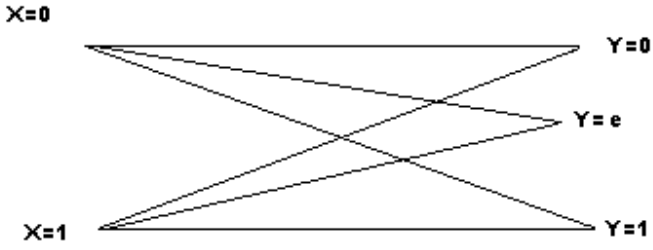

fig (3.1)