Answer on Question #44953 – Math - Statistics and Probability

For a certain Binary, communication channel, the probability that a transmitted '0' is received as a '0' is 0.95 and the probability that a transmitted '1' is received as '1' is 0.90. If the probability that a '0' is transmitted is 0.4, find the probability that

(i) a '1' was transmitted given that a '1' was received

(ii) a '1' is received

Solution

A is event of transmitting '1', $\bar{A}$ is event of transmitting '0', B is event of receiving '1', $\bar{B}$ is event of receiving '0'.

(i)

$$P(A|B) = \frac{P(A)P(B|A)}{P(B)} = \frac{0.6 \cdot 0.9}{0.56} = \frac{27}{28}.$$

(ii)

$$P(B) = P(A)P(B|A) + P(\bar{A})P(B|\bar{A}) = (1 - 0.4)0.9 + 0.4(1 - 0.95) = 0.6 \cdot 0.9 + 0.4 \cdot 0.05 = 0.56.$$