Assignment3(Q.11.16.3.13)
NCERT EXAMPLER
Probability And Random Processes

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Variable	Description
X	No of Red Balls
Y	No of White Balls
Z	Total no of Balls

TABLE 0
Random Variables

Probability of events	Probability Value
Pr(R)	5/13
Pr(W)	8/13

TABLE 0
Probability Value

I. Q.11.16.3.13

A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the Probability that
(a) All the three balls are white
(b) All the three balls are red
(c) One ball is red and two balls are white

Solution:

Let X be the number of red balls drawn. Let Y be the number of white balls drawn. Let Z be the total number of balls drawn, which is always 3 in this case.

We know there are 8 red balls and 5 white balls in the bag. Therefore,

(a) Probability that all three balls are white (X = 0, Y = 3):
P(X = 0, Y = 3, Z = 3) = P(X = 0) * P(Y = 3, X = 0) * P(Z = 3, X = 0, Y = 3)
P(X = 0) = (5/13) * (4/12) * (3/11)
P(Y = 3, X = 0) = 1
P(Z = 3, X = 0, Y = 3) = 1
Now, calculate the overall probability:
P(X = 0, Y = 3, Z = 3) = (5/13) * (4/12) * (3/11) * 1 * 1 = 60/1716 = 10/286 0.034965.

(b) Probability that all three balls are red (X = 3—Y = 0):
P(X = 3, Y = 0, Z = 3) = P(X = 3) * P(Y = 0 ,X = 3) * P(Z = 3, X = 3, Y = 0)
P(X = 3) = (8/13) * (7/12) * (6/11)
P(Y = 0, X = 3) = 1
P(Z = 3, X = 3, Y = 0) = 1
Now, calculate the overall probability:
P(X = 3, Y = 0, Z = 3) = (8/13) * (7/12) * (6/11) * 1 * 1 = 0.195804196

(c) Probability that one ball is red and two balls are white (X = 1 — Y = 2):
P(X = 1, Y = 2, Z = 3) = P(X = 1) * P(Y = 2, X = 1) * P(Z = 3, X = 1, Y = 2)
P(X = 1) = (8/13) * (5/12) * (4/11)
P(Y = 2, X = 1) = (5/11) * (4/10)
P(Z = 3, X = 1, Y = 2) = 1
Now, calculate the overall probability:
P(X = 1, Y = 2, Z = 3) = (8/13) * (5/12) * (4/11) * (5/11) * (4/10) * 1 = 1600/17160