Assignment3($Q_1$1.16.3.13)
NCERT EXAMPLER
Probability And Random Processes

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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: To solve this problem using random variables, you can use the concept of probability mass functions (PMFs) for discrete random variables. Let's define two random variables:

Let X represent the number of white balls drawn, and Y represent the number of red balls drawn. Then, X and Y can take values 0, 1, 2, or 3.

Now, we can calculate the probabilities for each scenario:

(a) All three balls are white:

$$Pxy(X = 3|Y = 0) = (5/13)*(4/12)*(3/11) = 0.0174$$

Here, the probability of the first white ball being drawn is 5/13 (since there are 5 white balls out of 13 total balls), the probability of the second white ball is 4/12 (as there are now 4 white balls out of 12 remaining balls), and the probability of the third white ball is 3/11 (3 white balls out of 11 remaining balls).

(b) All three balls are red:

$$Pxy(X = 0|Y = 3) = (8/13)*(7/12)*(6/11) = 0.1261$$

Here, the probability of the first red ball being drawn is 8/13, the probability of the second red ball is 7/12, and the probability of the third red ball is 6/11.

(c) One ball is red and two balls are white:

$$Pxy(X = 2|Y = 1) = (5/13)*(4/12)*(8/11) = 0.1034$$

Here, the probability of the first two balls being white is the same as in part (a), and the probability of the third ball being red is 8/11 (since there are 8 red balls out of 11 remaining balls).