Assignment Probability

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FWC22088 IITH Future Wireless Communication (FWC) probability

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1 Problems

1. Q:11,16.4,4
2. Q:12,13.2,1
3. Q:12,13.4,4

1.1 Problem1

Q1: In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded.What is the probability of not getting a prize if you buy (a) one ticket (b) two tickets (c) 10 tickets ?

solution:

Given,

Total no of tickets sold = S = 10000
Number of prizes awarded = 10
Number of tickects not awarded = 9990
let X = {1,2,10} and Y = {0,1}

(a) one ticket

P(getting prize) = P(11) = $\frac{10}{10000} = \frac{1}{1000}$
P(not getting a prize)= P(10) = 1 - P(1)
P(0) = $\frac{999}{1000}$

(b) two tickets

P(not getting a prize) = P(20)= $\frac{^{9990}C_2}{^{10000}C_2}$

(c) 10 tickets

P(not getting a prize) = P(100)= $\frac{^{9990}C_{10}}{^{10000}C_{10}}$

1.2 Problem2

Q2: If P(A)=$\frac{3}{5}$ and P(B)=$\frac{1}{5}$ find P(A∩B) if A and B are independent events ?

solution:

Given,

P(A) = $\frac{3}{5}$ and P(B) =$\frac{1}{5}$
P(AB) = P(A) * P(B)
P(AB) = $\frac{3}{5} * \frac{1}{5}$
P(AB) = $\frac{3}{25}$

1.3 Problem3

Find the probability distribution of
(i) number of heads in two tosses of a coin.
(ii) number of tails in the simultaneous tosses of three coins.
(iii) number of heads in four tosses of a coin.

solution:

(i) number of heads in two tosses of a coin.

Given, number of trails = n = 2
probability of getting head for one coin = p =$\frac{1}{2}$
probablity of not getting a head = q = 1-p = $\frac{1}{2}$
let X represent the number of heads in two tosses of a coin
$\therefore$ the values of X = {0,1,2}
by using binomial distribution

$$P(X) = {}^nC_X p^X q^{n-X}$$

Thus,the required probility distribution is

X	0	1	2
P(X)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

(ii) number of tails in the simultaneous tosses of three coins.

Given, number of trails= n = 3
probability of getting tail for one coin = p = $\frac{1}{2}$
probalility of not getting tail = q = 1-p = $\frac{1}{2}$
let X represents the number of tails in simultaneous tosses of three coins $\therefore$ the values of X = {0,1,2,3}
by using binomial distribution

$$P(X) = {}^nC_X p^X q^{n-X}$$

Thus,the required probility distribution is

X	0	1	2	3
P(X)	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

(iii) number of heads in four tosses of a coin.

given, number of trails n = 4
probability of getting a head for one coin = p =$\frac{1}{2}$
probability of not getting a head = q = 1-p = $\frac{1}{2}$
let X represents the number of tails in simultaneous tosses of three coins $\therefore$ the values of X = {0,1,2,3,4}
by using binomial distribution

$$P(X) = {}^nC_X p^X q^{n-X}$$

Thus,the required probility distribution is

X	0	1	2	3	4
P(X)	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{6}{16}$	$\frac{4}{16}$	$\frac{1}{16}$