

# Assignment 4

P Ganesh Nikhil Madhav -CS20BTECH11036

Download latex-tikz codes from

<https://github.com/Nik123-cpp/Assignment-4/blob/main/main.tex>

,Favourable cases for inclusion of unit(1) are case (1,2,3),So

$$P_1 = \Pr(1, 2) + \Pr(1, 3) + \Pr(1, 4) \quad (2.0.4)$$

using (2.0.3) and  $p_i$  from question ,

$$P_1 = \frac{7}{30} + \frac{7}{30} + \frac{7}{30} \quad (2.0.5)$$

$$= 0.7 \quad (2.0.6)$$

Therefore Option (3) is correct.

## 1 PROBLEM UGC—MATH 2019,Q.58

A sample of size  $n = 2$  is drawn from a population of size  $N = 4$  using probability proportional to size without replacement scheme , Where the probabilities proportional to size are

i:	1	2	3	4
$p_i$	0.4	0.2	0.2	0.2

Table : Probability vs Size

The probability of inclusion of unit (1) in the sample is

- 1) 0.4      2) 0.6      3) 0.7      4) 0.75

## 2 SOLUTION

Let  $P_i(j)$  represent the probability for selecting unit (j) as second unit after selecting unit (i)

$$P_i(j) = \frac{p_j}{1 - p_i} \quad (2.0.1)$$

Let  $\Pr(i, j)$  be probability of selecting sample {i,j} ,using (2.0.1) is

$$\Pr(i, j) = P_i(j) + P_j(i) \quad (2.0.2)$$

$$= \left( p_i \times \frac{p_j}{1 - p_i} \right) + \left( p_j \times \frac{p_i}{1 - p_j} \right) \quad (2.0.3)$$

Total samples(Size  $n = 2$ )are

Case	1	2	3	4	5	6
Sample(size $n = 2$ )	(1,2)	(1,3)	(1,4)	(2,3)	(2,4)	(3,4)

TABLE 4: list of samples

Let  $P_i$  be the probability of inclusion of unit (i) in the sample(size  $n = 2$ ),Now i will calculate  $P_1$