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Ans-no⇒9.4

Serial Numbers	1	2	3	4	5	6	7	8	9	10
Observation	5	8	7	10	7	6	9	11	4	2
Serial Numbers	11	12	13	14	15	16	17	18	19	20
Observation	7	7	12	9	11	3	7	8	5	6
Serial Numbers	21	22	23	24	25					
Observation	7	6	9	11	4					

a.

Random Numbers	5	11	17	23
Signals Received	7	7	7	9

Here, the population size, $N = 25$

sample $= 4$.

Sampling interval, $K = \frac{25}{4} = 6.25 \simeq 6$

Now, 1 to 6 ; any random number is 5.

~~Estimate of mean~~ $\cancel{= \frac{25}{4} = 6.25}$

~~Estimate of total number,~~

$\cancel{x = N^2\bar{x} = (25)^2 \times 6.25 = 156.25}$

Hence

$$s^2 = \frac{1}{n-1}\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]$$

$$= \frac{1}{4-1} \times \left[(7^2+7^2+7^2+9^2) - \frac{(7+7+7+9)^2}{4} \right]$$

$$= 1$$

Variance of sample mean, $V(\bar{x})$

$$= \frac{N-n}{Nn} \times S^2$$

$$= \frac{25-4}{25 \times 4} \times (1)^2 = 0.21$$

Here, standard error of estimate of mean $= \sqrt{v(\bar{x})}$

$= \sqrt{0.21} = 0.458$

The estimate of standard error of population total is,

$v(\hat{x}) = N^2 v(\bar{x}) = (25)^2 \times 0.21$

$= 131.25$

$\bar{x} = \sqrt{v(\hat{x})} = \sqrt{131.25} = 11.46$

[Ans]

(b) ~~Popu~~ Proportion, $p = \frac{3}{4} = 0.75$

[Ans]

Ans-no⇒9.5

Serial Numbers	1	2	3	4	5	6	7	8	9	10
Observation	4	3	0	2	6	7	4	3	2	0
Serial Numbers	11	12	13	14	15	16	17	18	19	20
Observation	1	0	3	0	6	8	0	1	14	3
Serial Numbers.	21	22	23	24	25	26	27	28	29	30
Observation	2	6	3	7	5	8	0	2	3	5

Using by simple random sampling method

Random Number	11	16	9	12	19
Observation	1	8	2	0	4

$$s^2 = \frac{1}{n-1} \times \left[\sum x^2 - \frac{(\sum x)^2}{n} \right]$$

$$= \frac{1}{5-1} \left[(1^2 + 8^2 + 2^2 + 0^2 + 4^2) - \frac{(1+8+2+0+4)^2}{5} \right]$$

$$= 10$$

Variance of sample mean,

$$v(\bar{x}) = \frac{N-n}{Nn} \times s^2$$

$$= \frac{30-5}{30 \times 5} \times (10)^2$$

$$= \cancel{16.67}\ 1.67.$$

Here, standard error of estimate of mean $= \sqrt{v(\bar{x})} = \sqrt{1.67}$

$$= 1.292$$

The estimate of standard error of population total is,

$$v(\hat{x}) = N^2 \cdot v(\bar{x}) = (30)^2 \times 1.67$$

$$= 1503.$$

$$x = \sqrt{v(\hat{x})} = \sqrt{1503} = 38.77$$

[Ans]

Ans-no ⇒ 9.6

Here, proportion, $p = 0.45$

Margin of error, $d = 0.1$

$$\text{Size, } n = \frac{z^2 \cdot \cancel{v(x)}\ pq}{d^2}$$

$$= \frac{(1.96)^2 \times 0.45 \times 0.55}{(0.1)^2}$$

$$= 95.08 \simeq 95$$

[Ans].

Ans-no ⇒ ~~9.~~9.7

Serial Number	1	2	3	4	5	6	7	8
Observation	10	7	6	9	11	4	2	7
Serial Number	9	10	11	12	13	14	15	16
Observation	7	9	11	45	8	7	10	7
Serial Number	17	18	19	20	21	22	23	
Observation	6	9	11	4	2	7	7	

Here, $N = 23$ and $n = 4$.

Using by simple random sampling method,

Random days	11	16	9	12
Observation	11	7	7	45

$$s^2 = \frac{1}{n-1} \times \left[\Sigma x^2 - \frac{(\Sigma x)^2}{n} \right]$$

$$= \frac{1}{4-1} \times \left[(11^2 + 7^2 + 7^2 + 45^2) - \frac{(11+7+7+45)^2}{4} \right]$$

$$= 339.67$$

Variance of sample mean, $v(\bar{x})$

$$= \frac{N-n}{Nn} \times s^2$$

$$= \frac{23-4}{23 \times 4} \times 339.67$$

$$= 70.15$$

Standard error of estimate of mean $= \sqrt{v(\bar{x})} = \sqrt{70.15}$

$= 8.376$. [Ans].

Ans-no ⇒ 9.8

Here,

proportion, $p = 0.3$

Margin of error $= 0.05$

$$\text{Size, } n = \frac{z^2 pq}{d^2}$$

$$= \frac{(1.96)^2 \times 0.3 \times 0.7}{(0.05)^2}$$

$$= 322.694 \simeq 323$$

[Ans].