Assignment 2

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9.4

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

$N = 25$
$n = 4$

$k = \frac{N}{n} = \frac{25}{4} = 6.25 \approx 6$

$\cancel{1-6}\ 1-k \approx 1-6$

5, 11, 17, 23,

Serial Number	5	11	17	23
Signals ~~Random Variable~~ (x)	7	8	7	9

(a) Total number of signals /day , $\bar{X} = N\bar{x}$

$= 25 \times \left(\frac{31}{4}\right) = 193.75$

$\bar{x} = 7.75$

$s.e.(\bar{x}) = \sqrt{V(\bar{x})} = \sqrt{0.1925} = 0.439$

$V(\bar{x}) = \frac{N-n}{Nn} s^2 = \frac{25-4}{25 \times 4} \cdot \left(\frac{11}{12}\right) = \frac{77}{400} = 0.1925$

$s^2 = \frac{1}{3}\left[243 - \frac{961}{4}\right] = \frac{11}{12}$

(b) $p = a/n = \frac{2}{4} = 0.5$

② Page

Serial : 4

9.5

Number	11	16	09	12	19
Signal	1	8	2	0	4

$N = 30$
$n = 5$

$\bar{x} = \frac{\sum x}{n} = \frac{15}{5} = 3$

$\bar{X} = N\bar{x} = 30 \times 3 = 90$

Total number of faded signals is 90

$s^2 = 10$

$V(\bar{x}) = \frac{30-5}{30 \times 5} \times 10 = \frac{5}{3}$

$s.e.(\bar{X}) = \sqrt{5/3} = 1.291$

9.6

$n = \frac{z^2 \, pq}{d^2} = \frac{(1.96)^2 \times 0.45 \times 0.55}{(0.1)^2} = 95.1$

≈ 95

9.7

Number	11	16	09	12
mail	11	7	7	45

$\bar{x} = \frac{70}{4} = 17.5$
≈ 18

$s^2 = \frac{1}{3}\left((2245) - \frac{4900}{4}\right) = 340$

$V(\bar{x}) = \frac{23-4}{23 \times 4} \times 340 = 70.2$

$s.e. = \sqrt{70.2} = 8.379$

9.8

$n = \frac{z^2 \, pq}{d^2} = \frac{(1.96)^2 \times 0.3 \times 0.7}{(0.05)^2} = 322.69$

≈ 323

9.4

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

Random	5	11	17	23
Signal	7	7	7	9

N = 25

sample = 4

$k = \frac{25}{4}$

6.25

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

$$\cancel{= \frac{1}{4-1}\left[\Sigma (7+7+7+9)^2 - (7+7+7+9\right.}$$

$$= \frac{1}{4-1} \quad (7+7+7+9)^2 - \frac{(7+7+7+9)^2}{4}$$

$$= 1$$

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

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

$$= \frac{25-4}{25 \times 4} \times 1 \quad = 0.21$$

Standard error of estimate of mean

$$= \sqrt{V(\bar{x})}$$

$$= \sqrt{0.21} = 0.458$$

The estimatate of standard error

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

$$= 131.25$$

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

b) Proportion $p = \frac{3}{4} = 0.75$

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9 5

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

Random Num	11	16	9	12	19
observation	1	8	2	0	4

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

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

$$= 10$$

variance of sample

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

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

$$= 1.67$$

standard error of estimate of mean

$$\sqrt{v(\bar{x})} = \sqrt{1.67} = \cancel{792}\ 1.292$$

The estimate of standard error of population

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

$$= 1503$$

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

$$= 38.77$$

9.6

Proportion $P = 0.45$

Margin of error $= 0.1$

$$n = \frac{z^2 \, PQ}{d^2}$$

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

$$= 95.08 = 95$$

9.7

Serial	1	2	3	4	5	6	7	8	9	10	11	12		
Observation	10	7	6	9	11	4	2	7	7	9	4	45		
Serial	13	14	15	16	17	18	19	20	21	22	23	~~24~~	~~25~~	
Observation	8	7	10	7	6	9	11	4	2	7	7			

$N = 23$ and $n = 4$

random units	11	6	9	12
Observation	4	7	7	45

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

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

$$= 339.67$$

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 $\sqrt{V(\bar{x})}$

$$\sqrt{70.15}$$

$$8.376$$

9.8

Proportion $P = 0.3$

Margin of error $= 0.05$

Size $n = \frac{z^2 p q}{d^2}$

$$= \frac{(1.96)^2 \times 0.3 \times 0.7}{(0.05)^2} = 322.694$$

$$= 323$$

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20-41959-1

Assignment-2

Serial : 07
Section :- O

9.4

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

a) Here, population size $N = 25$

Sample size $n = 4$

Sampling Interval $k = \frac{N}{n} = \frac{25}{4} = 6.25 \approx 6$

Now,

$1 - k = 1 - 6$

So, selected sample is, 5, 11, 17, 23

Now,

Random Number	5	11	17	23
Signals recored	7	7	7	9

Now,

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

$$= \frac{1}{3}\left[228 - 225\right] = 1$$

$$v(\bar{x}) = \frac{N-n}{Nn}(s^2) = \frac{25-4}{25 \times 4} \times 1 = 0.21$$

And,

$$\bar{x} = \sqrt{v(\bar{x})} = \sqrt{0.21} = 0.45$$

The Estimate of standard error of estimate of population total is,

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

And, $= 25^2 \times 0.45 = 286.41$

$$\hat{X} = \sqrt{v(\hat{x})}$$

$$= \sqrt{286.41} = 16.92$$

(b) Estimate the proportion of days which less than 8 signals are received.

In our ~~population~~ sample there are 3 signal are less than 8. so, $a = 3$

$$\text{so, } p = \frac{a}{n} = \frac{3}{4} = 0.75$$

9.5

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

Now,

use sample random sampling methode

The 5 random days are

11, 16, 09, 12, 19

Random Number	11	16	09	12	19
signal Faded	1	8	2	0	4

Now,

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

$$= \frac{1}{4}\left[85 - 45\right] = \frac{40}{4} = 10$$

The variance of sample mean is $v(\bar{x}) = \frac{N-n}{Nn}(s^2)$

$$= \frac{30-5}{30\times5}(10)$$

And,

$$= 1.67$$

$$\bar{x} = \sqrt{v(\bar{x})} = \sqrt{1.67} = 1.29$$

The stimate of standard error of estimate of population total is,

$$v(\hat{x}) = N^2 v(\bar{x}) = 30^2 \times 1.67 = 1503$$

and, $\bar{x} = \sqrt{v(\bar{x})} = \sqrt{1530}$

$$= 38.76$$

9.6

Given that.

Margin of error $d = 0.1$

$p = 0.45$

$q = 0.55$

And, $z = 1.96$

The sample size n is given by,

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

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

$$= 95.07$$

$$= 95$$

9.7

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

Use simple random sampling ~~fere~~ selected 4 days are,

11, 16, 9, 12

Now,

Random Number	11	16	9	12
Mails received	11	7	7	45

Now,

$$s^2 = \frac{1}{n-1}\left[\sum x^2 - \frac{(\sum x)^2}{n}\right] = \frac{1}{3}(2244 - 491225)$$

$$= 339.67$$

The variance of sample mean is,

$$V(\bar{x}) = \frac{N-n}{Nn} s^2 = \frac{23-4}{23\times4}(339.67)$$

$$= 70.14$$

The standard error of estimate of mean is,

$$\bar{x} = \sqrt{V(\bar{x})} = \sqrt{70.14}$$

$$= 8.37$$

9.8

Given that, Margin of error $d = 0.05$

$P = 0.3$

$q = 0.7$

And, $z = 1.96$

The sample size n is given by

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

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

$$= 322.69$$

$$\simeq 322$$

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Serial no: 08

20-42006-1

9.4. a) Here the population size is 25 ~~and the~~

and sample size 4

So, Sampling interval $K = \frac{N}{n} = \frac{25}{4} = 6.25 \approx 6$

Now
$1-K = 1-6$ any random number $1-K$ is 5

Select numbers 5, 11, 17, 23

Serial	5	11	17	23
observation value	7	7	7	9

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

$= \frac{1}{4-1}\left[228 - \frac{900}{4}\right] = 1$

$V(\bar{x}) = \frac{N-n}{Nn} s^2 = \frac{25-4}{25 \times 4}$

$\times (1)^2 = \frac{21}{100} = 0.21$

And $\hat{\sigma}_{\bar{x}} = \sqrt{v(\bar{x})} = \sqrt{0.21} = 0.4583$

the estimate of standard error of population

total is

$$v(\hat{x}) = N^2 (v\bar{x}) = 25^2 \times 0.21 = 131.25$$

and $\hat{\sigma}_{\hat{x}} = \sqrt{v(\hat{x})} = \sqrt{131.25} = 11.4569$

b. Estimated the population of days which less

than 8 signal are received.

In our selected sample there are 3 signal

are less then 8 so, $a = 3$

$$p = \frac{a}{n} = \frac{3}{4} = 0.75$$

7.5 unit simple random sampling method

the 5 random numbers are 11, 16, 9, 12, 10

Random number	11	16	9	12	10
observation	1	8	2	0	4

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

The variance of sample mean is $V(\bar{x}) =$

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

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

$$= 1.67$$

and $\bar{x} = \sqrt{V(\bar{x})} = \sqrt{1.67} = 1.292$

The estimated of standard error of population is

$V(\hat{x}) = N^2(\bar{x}) = 30^2 \times 1.67 = \cancel{1503}\ 1503$

and $\hat{x} = \sqrt{V(\hat{x})} = \sqrt{1503} = 38.768$

<u>9.6]</u> Given that

margin of error $d = 0.1$

$p = 0.45$

$q = 0.55$

$z = 1.96$

The ~~sam~~ sample size is given by $n = \frac{z^2 pq}{d^2}$

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

$$= 95.07 \approx 95$$

~~Q.7~~ Q.7) Using simple random sampling selected

11, 16, 9, 12

Now

Random days	11	16	9	12
observation	11	7	7	45

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

$$= \left[2244 - \frac{4900}{4}\right] = 339.67$$

The variance of sample mean is $V(x) = \frac{N-n}{N \cdot m} s^2$

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

$$= 70.15$$

The standard error of estimate of mean is

$$\bar{x} = \sqrt{V(\bar{x})} = \sqrt{70.15} = 8.37$$

7.b) Given that

margin of $d = 0.05$

$p = 0.3$

$q = 0.7$

and $z = 1.96$

The sample size n is given by $n = \frac{z^2 pq}{d^2}$

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

$$= 322.69 \approx 323$$

Abu Taher Mahim Sarkar, ID:20-42042-1, SL-09

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, $K = \frac{25}{4} = 6.25 \approx 6$

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 $= \sqrt{v_r(\bar{x})}$

$= \sqrt{0.21} = 0.458$.

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) ~~Popul~~ 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

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

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

$$= 10$$

Variance of sample mean,

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

$$= \frac{30-5}{30\times5} \times (10)^2$$

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

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 ⇒ ~~10~~ 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	15	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 $= \sqrt{v(\bar{x})} = \sqrt{70.15}$

$$= 8.376. \text{ [Ans]}$$

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].

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ID: 20-42079-1

Ans to the Que No: 4

serial numbers	1	2	3	4	5	6	7	8	9	10
Observations	5	8	7	10	7	6	9	11	4	2
serial numbers	11	12	13	14	15	16	17	18	19	20
Observations	7	7	12	9	11	3	7	8	5	6
serial numbers	21	22	23	24	25					
observations	7	6	9	11	4					

a)

Random number	5	11	17	23
signals received	7	7	7	9

Here the population size, $N = 25$

sample $= 4$

sampling interval, $K = \frac{25}{4} = 6.25 \approx 6$

Now, 1 to 6; any random number is 5

Hence,

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

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serial - 10

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

$= 1$

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

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

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

Hence, standard error of estimates of mean $= \sqrt{v_2(\bar{x})}$

$$= \sqrt{0.21} = 0.458$$

The estimate of standard error Population total is

$$v(\hat{x}) = N^2 v(\bar{x}) - (25)^2 \times 0.25$$
$$= 133.25$$

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

(Ans)

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

(Ans)

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Serial - 10

Ans to the Que No:- 9.5

serial number	1	2	3	4	5	6	7	8	9	10
observation	4	3	0	2	6	7	4	3	2	0
serial number	11	12	13	14	15	16	17	18	19	20
observation	1	0	3	0	6	8	0	1	4	3
serial number	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

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

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

$= 10$

varience of sample mean.

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

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

$$= 1.67$$

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

$$= 1.292$$

The estimate of standard error Population total is.

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

$$= 1503$$

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

(Ans)

serial-10

Ans to the Que No-9.6

Here, proportion $p = 0.45$

Margin of error, $d = 0.1$

Size, $n = \frac{Z^2 . pq}{d^2}$

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

$= 95.08 \approx 95$ (Ans)

Ans to the Que No-9.7

serial number	1	2	3	4	5	6	7	8
observation	10	7	6	9	21	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	

Scanned with CamScanner

serial-10

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

Using by simple random sampling method,

Pospodays	11	16	19	12
Observation	11	7	7	45

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

$$= 339.67$$

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

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

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

$$= 70.15$$

serial - 10

standard error of estimate of mean $= \sqrt{V(\bar{x})} = \sqrt{70.15}$

$= 8.376$ (Ans)

Ans to the Que No - 9.8

Here,

proportion $p = 0.3$

Margin of error $= 0.05$

size; $n = \frac{z^2 pq}{d^2}$

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

$= 322.694 \approx 323$

(Ans)

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Assignment - 2

Name : Md. Altabur Rahman

ID : 20-42107-1

$\boxed{9.4}$

$$k = \frac{N}{n}$$

$$= \frac{25}{4}$$

$$= 6.25 \sim 6$$

k = 6 is an one digit number. We need to find the first value.

Random number	5	11	17	23
Signals received	7	7	7	9

Observation (x)	5	8	7	10	7	6	9	11	4	2	7	7
Serial no.	1	2	3	4	5	6	7	8	9	10	11	12

Observation(x)	12	9	11	3	7	8	5	6	7	6	9	11	4
Serial no.	13	14	15	16	17	18	19	20	21	22	23	24	25

(a) mean $(\bar{x}) = \frac{30}{4}$

$= 7.5$

Total number $= N\bar{x}$

$= (25 \times 7.5)$

$= 187.5$

$\therefore$ standard error of total $se(\hat{x}) = \sqrt{v(\hat{x})}$

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

there,

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

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

$$= \frac{1}{3}\left[220 - \frac{(30)^2}{4}\right]$$

$$= 1$$

$$\therefore v(\bar{x}) = \frac{25-4}{25 \times 4}(1)$$

$$= 0.21$$

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

$$= 131.25$$

$$se(\hat{x}) = \sqrt{v(\hat{x})}$$

$$= \sqrt{131.25}$$

$$= 11.46. \text{ (Ans)}$$

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9.5

observation (x)	4	3	0	2	6	7	4	3	2	0	1	0	3	0	6
serial	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
observation (x)	8	0	1	4	3	2	6	3	7	5	8	0	2	3	5
serial	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

$N = 30$

$n = 5$ as 2 digit number

Random no.	11	16	9	12	19
faded out signals	1	8	2	0	4

$$\text{mean} = \frac{1}{n}\sum n$$

$$= \frac{15}{5}$$

$$= 3$$

Estimated total $\hat{x} = N\bar{x}$

$$= 30 \times 3$$

$$= 9$$

standard error of total $se(\hat{x}) = \sqrt{V(\hat{x})}$

$$V(\hat{x}) = N^2 V(\bar{x})$$

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

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

$$= \frac{1}{9}\left[85 - \frac{(15)^2}{5}\right]$$

$$= \frac{1}{9} \times 90$$

$$= 10$$

$$V(\bar{x}) = \frac{30-5}{30\times 5} \times 10$$

$$= 1.67$$

variance, $V(\hat{x}) = (30)^2 \cdot (1.67)$

$$= 1503$$

Standard error of total,

$$se(\hat{x}) = \sqrt{V(\hat{x})}$$

$$= \sqrt{1503}$$

$$= 38.77 \text{ (An.)}$$

9.6 given,

$$p = 0.45$$

$$q = 0.55$$

$$d = 0.1$$

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

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

$$= 95.$$

$\boxed{9.7}$

observation (x)	10	7	6	9	11	4	2	7	7	9	11	45
Serial no.	1	2	3	4	5	6	7	8	9	10	11	12
observation (x)	8	7	10	7	6	9	11	4	2	7	7	
Serial no.	13	14	15	16	17	18	19	20	21	22	23	24

$N = 23$ sample $= 4$

Random number	11	16	9	12
mails received	11	7	7	45

$$\therefore \text{mean} = \frac{1}{n}\sum x$$

$$= \frac{70}{4}$$

$$= 17.4 \sim 17$$

$$se(\bar{x}) = \sqrt{v(\bar{x})}$$

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

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

$= \frac{1}{3}\left[2244 - \frac{9900}{4}\right]$

$= 339.67$

$v(\bar{x}) = \frac{23-4}{23 \times 4} \times 339.67$

$= 70.15$

$Se(\bar{x}) = \sqrt{v(\bar{x})}$

$= \sqrt{70.15}$

$= 8.30.$

(Ans)

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9.8

$p = 0.3$

$q = 0.7$

$d = 0.05$

$n = ?$

The sample size of, $n = \frac{z^2 pq}{d^2}$

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

$= 322.69$

(Ans)

Name:- Md. Tanvir Hossen

ID:- 20-42488-1

SL = 14

Q.4

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

a) Estimate of mean, $\bar{x} = \frac{1}{n}\sum x = \frac{30}{4} = 7.5$

$\therefore$ " total, $\hat{x} = N\bar{x} = 25 \times 7.5 = 187.6$

$$s^2 = \frac{1}{n-1}\left[\sum x^2 - \frac{(\sum x)^2}{n}\right] = \frac{1}{3}\left[228 - \frac{900}{4}\right] = 1$$

$\therefore$ Variance of sample mean $\Rightarrow V(\bar{x}) = \frac{N-n}{Nn} s^2$

$= \frac{25-4}{25\times 4} \times 1$

$= 0.21$

estimate standard error, $N^2 V(\bar{x}) = (25)^2 \times 0.21$

$= 131.25$

$\therefore$ S.e $(\hat{x}) = \sqrt{N^2 V(\bar{x})} = \sqrt{131.25}$

$= 11.456$ Ans

b) $P = \frac{a}{n} = \frac{16}{4} = 4$ Ans

Q.5)

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

R. Num.	11	16	9	12	19
P. of S. sign	1	8	2	0	4

Estimate of mean, $\bar{x} = \frac{1}{n}\sum x = 3$

" " total, $\hat{x} = N\bar{x} = 30\times 3 = 90$

$$s^2 = \frac{1}{n-1}\left[\sum x^2 - \frac{(\sum x)^2}{n}\right] = \frac{1}{5-1}\left[85 - \frac{225}{5}\right] = 10$$

$$V(\bar{x}) = \frac{N-n}{Nn}s^2 = 1.67$$

$\therefore N^2 V(\bar{x}) = 1500$

$\therefore s.e(\hat{x}) = \sqrt{N^2 V(\bar{x})} = \sqrt{1500} = 38.73$ Ans

9.6) Sample size $n = \frac{Z^2 pq}{d^2} = \frac{(1.96)^2 \times 0.45 \times 0.55}{(0.1)^2}$

$= 95$ Ans

9.7)

SL. Num.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Observation	10	7	6	9	11	4	2	7	7	9	11	45	8	7
SL. Num.	15	16	17	18	19	20	21	22	23	~~24~~	~~25~~	~~26~~		
Obser.	10	7	6	9	11	4	2	7	7					

R. number	11	16	9	12
No. of mails	11	7	7	45

Estimate of mean, $\bar{x} = \frac{1}{n}\sum x = 70$

$s^2 = \frac{1}{n-1}\left[\sum x^2 - \frac{(\sum x)^2}{n}\right] = \frac{1}{4-1}\left[2244 - \frac{4900}{4}\right] = 339.67$

$V(\bar{x}) = \frac{N-n}{Nn} s^2 = 70.149$

$s.e(\bar{x}) = \sqrt{V(\bar{x})} = 8.375$ Ans

9.8) Sample size $= \frac{Z^2 pq}{d^2} = \frac{(1.96)^2 \times 0.3 \times 0.7}{(0.05)^2}$

$= 322$ Ans

Assignment FT-2
Name: MD. Shanjidul Islam Sadhin
ID: 20-42621-1

9.4

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

(a) Here the population size is 25. And sample size is 4

So, Sampling interval $k = \frac{N}{n} = \frac{25}{4} = 6.25 \approx 6$

Now,
~~random~~ $1-k = 1-6$ any random numbe $1-k$ is '5'
selected numbers 5, 11, 17, 23

Serial/Days	5	11	17	23
Observ. value	7	7	7	9

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

$= \frac{1}{4-1}\left[228 - \frac{900}{4}\right] = 1$

$V(\bar{x}) = \frac{N-n}{Nn} s^2 = \frac{25-4}{25 \times 4} \times (1)^2 = \frac{21}{100} = 0.21$

$\longrightarrow$

And $\bar{x} = \sqrt{V(\bar{x})} = \sqrt{0.21} = 0.4583$

The estimate of standard error of population total is

$$V(\hat{X}) = N^2 (V\bar{x}) = 25^2 \times 0.21 = 131.25$$

and

$$\bar{X} = \sqrt{V(\hat{X})} = \sqrt{131.25} = 11.4564$$

(b) Estimated the proportion of day which less then 8 signals are recived,

In our selected sample there are 3 signal are less then 8 so, $a = 3$

$$P = \frac{a}{n} = \frac{3}{4} = 0.75$$

9.5 Given data,

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

now,

using: sample random sampling mathod.

The 5 random numbers are, 11, 16, 09, 12, 10.

Random number	11	16	09	12	10
observation	1	8	2	0	4

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

$= \frac{1}{4}[85 - 45] = 10$

The variances of sample mean is $v(\bar{x}) = \frac{N-n}{N \cdot n} \times (s^2)$

$= \frac{30-5}{30\times5}(10)$

$= 1.67$

And $\bar{x} = \sqrt{v(\bar{x})} = \sqrt{1.67} = 1.292$

The ~~stan~~ estimate of standard error of population tota is

$v(\hat{X}) = N^2 v(\bar{x}) = 30^2 \times 1.67 = 1503$

and $\hat{X} = \sqrt{v(\hat{X})} = \sqrt{1503} = 38.768$

9.6 Given that,

mergin of error, $d = 0.1$

$p = 0.45$

$q = 0.55$,

$z = 1.96$

The sample size is given by $n = \frac{z^2 pq}{d^2} = \frac{(1.96)^2 \times 0.45 \times 0.55}{(0.1)^2}$

$= 95.07$

$= 95$,

9.7

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

Using simple random sampling selected 4 days

11, 16, 9, 12

Now,

Random days	11	16	9	12
obserbation	11	7	7	45

Here

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

$$= \frac{1}{3}\left[2244 - \frac{4900}{4}\right] = 339.67$$

The variance of sample mean is $V(\bar{x}) = \frac{N-n}{N.n} s^2$

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

$$= 70.15$$

The sandard error of estimate of mean is

$$\bar{x} = \sqrt{V(\bar{x})} = \sqrt{70.15} = 8.38.$$

9.8 Given that,

margin of $d = 0.05$.

$p = 0.3$

$q = 0.7$

And $z = 1.96$.

The sample size n is given by $n = \frac{z^2 pq}{d^2}$

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

$$= 322.69 \approx 323$$

Name: Sidul Islam Sohag

Id: 20-42668-1 Serial: ~~17~~ 16

Assignments-2

Q.4| We Know,

Sampling interval, $K = \frac{N}{n}$

$= \frac{25}{4} = 6.25 \approx 6$

Here, K=6 and 6 is one digit number, we need to findout only me value (first value) between (1-K) and it must be less from the value of K.

Rendom Number	5	11	17	23
Signal Recived	7	7	7	9

Ovsenbation (x)	5	8	7	10	7	6	9	11	4	2	7	7	12
Serial No	1	2	3	4	5	6	7	8	9	10	11	12	13

Ovsenbation (x)	9	11	3	7	8	5	6	7	6	9	11	4
Serial No	14	15	16	17	18	19	20	21	22	23	24	25

a) Here,

$$\text{mean}, (\bar{x}) = \frac{30}{4}$$
$$= 7.5$$

$\therefore$ Total number $= N\bar{x}$
$$= (25 \times 7.5)$$
$$= 187.5$$

$\therefore$ standard error of total $= s.e(\hat{x}) = \sqrt{V(\hat{x})}$
$$V(\hat{x}) = N^2 V(\bar{x})$$

Here,

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

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

$$= \frac{1}{3} \left| 228 - \frac{(30)^2}{4} \right|$$

$$= 1$$

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$\therefore V(\hat{n}) = \frac{25-4}{25 \times 4}(1)$

$= 0.21$

$\therefore V(\hat{n}) = (25)^2 \times (0.21)$

$= 131.25$

Now, $s.e(\hat{X}) = \sqrt{V(\hat{X})}$

$= \sqrt{131.25} = 11.46$ Ans.

b) The Poportion of days which less than 8 days is given by $P = \frac{a}{n}$.

Here, $a = 3$ [Number of days which less than 8]

$n = 4$ [given];

$P = \frac{3}{4}$

$= 0.75$ Ans

9.5

x	4	3	0	2	6	7	4	3	2	0	1	0	3	0	6	8
Serial	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

x	0	1	4	3	2	6	3	7	5	8	0	2	3	5
Serial	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Here,
$N = 30$. We need to select sample size, $n = 5$ using Random table. As, $N = 28$ which is 2 digits ~~m~~ number. So, we need to select random number of two digits.

Random no.	11	16	09	12	19
Faded out signals	1	8	2	0	4

$\therefore$ Mean $= \frac{1}{n} \sum x = \frac{15}{5} = 3$

$\therefore$ Estimate total, $\hat{x} = N\bar{x}$
$= 30 \times 3$
$= 90$

Standard error of total, $s.e(\hat{X}) = \sqrt{V(\hat{X})}$

Here,

$V(\hat{x}) = N^2 v(\bar{x})$

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

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

$= \frac{1}{4}\left|85 - \frac{(15)^2}{5}\right|$

$= \frac{1}{4} \times 40$

$= 10$

$\therefore v(\bar{x}) = \frac{30-5}{30 \times 5} \times 10$

$= 1.67$

$\therefore$ Variance, $V(\hat{x}) = (30)^2 . (1.67)$
$= 1503$

$\therefore$ Standard error of total. $s.e(\hat{x}) = \sqrt{v(\hat{x})}$

$$= \sqrt{1503}$$

$$= 38.77$$

Ans.

9.6

Here,

$p = 0.45$, $q = 0.55$

$d = 0.1$

We know,

The sample size n is given by,

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

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

$$= 95$$

9.7)

X	10	7	6	9	11	4	2	7	7	9	11	45	8	7
Serial No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
X	10	7	6	9	11	4	2	7	7					
Serial No.	15	16	17	18	19	20	21	22	23					

Here, $N = 23$ which is 2 digits. So, we need to select Random number of 2 digits. upto 4 sample. by following Random number Table.

Random Number	11	16	09	12
Mails received	11	7	7	45

$\therefore$ Mean $= \frac{1}{n} \sum x = \frac{70}{4} = 17.4 \approx 17$

$\therefore$ standard error of mean, $s.e(\bar{x}) = \sqrt{V(\bar{x})}$

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Here,

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

$$\therefore s^2 = \frac{1}{n-1}\left| \Sigma x^2 - \frac{(\Sigma x)^2}{n} \right|$$

$$= \frac{1}{3}\left| 2244 - \frac{4900}{4} \right|$$

$$= 339{\cdot}67$$

$$\therefore v(x) = \frac{23-4}{23 \times 4} \times 339{\cdot}67$$

$$= 70{\cdot}15$$

Standard error of Mean, $s.e(\bar{x}) = \sqrt{v(\bar{x})}$

$$= \sqrt{70{\cdot}15}$$

$$= 8{\cdot}38$$

Ans,

9.8

Here,

$p = 0.3$, $q = 0.7$

$d = 0.05$, $n = ?$

We know,

The sample size of, $n = \frac{z^2 pq}{d^2}$

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

~~= 332~~

$\therefore n = 322.69$

Ans.

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