#Assignment FT-2

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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	~~9~~	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 $\bar{x} = \sqrt{V(\bar{x})} = \sqrt{0.21} = 0.4583$

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 than 8 signals are recived,

In our selected sample there are 3 signal are lers 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 method.

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 $V(\bar{x}) = \frac{N-n}{N.n} \times (S^2)$

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

$= 1.67$.

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

The estimate of standard error of population tota

is

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

and $\bar{X} = \sqrt{V(\bar{X})} = \sqrt{1503} = 38.768$

9.6 Given that,

margin 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

Observation	10	7	6	9	4	4	2	7	7	9	11	45
serial	1	2	3	4	5	6	7	8	9	10	11	12
Observation	8	7	10	7	6	9	4	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
observation	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 $\epsilon = 0.05$.

$p = 0.3$

$q = 0.7$

And $z = 1.96$.

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

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

$$= 322.69 \approx 323$$