Statistics

Lecture 42

Feb 19-8:47 AM

In a Sample of 175 college students, 22% of them had a fulltime job while going to school.

NO C-level

Find Conf. interval for the prop. of all College students that have full time job.

$n = 175$

$\hat{p} = .22$

$\rightarrow x = n\hat{p} = 175(.22) = 38.5 \rightarrow x = 39$

if decimal, Round-up

use .95

1-PropZInt

$.161 < p < .285$

$E = \frac{.285 - .161}{2} = .062$

$\hat{p} = \frac{.285 + .161}{2} = .223$

Nov 14-8:49 AM

28 randomly selected college students had a mean weekly income of $750. $n=28$ $\bar{x}=750$

It is known that standard deviation of weekly income for all students is $150. $\sigma=150$

C-level: .98

Find 98% Conf. interval for the mean weekly income for all college students.

σ Known

⇒ Z Interval

inpt: Stats

$684 < \mu < 816$

$E = \frac{816-684}{2} = 66$

$\bar{x} = \frac{816+684}{2} = 750$

Nov 14-8:57 AM

I randomly selected 12 exams, here are the Scores

75	82	68	90
95	100	70	88
80	65	100	58

Store in L1

Use 1-Var Stats

Find

1) $\bar{x}=80.9$

2) $S=14.0$

} Round to 1-dec.

3) Find 99% Conf. interval for the mean of all exams.

$68.3 < \mu < 93.5$

$E = \frac{93.5-68.3}{2} = 12.6$

$\bar{x} = \frac{93.5+68.3}{2} = 80.9$

σ Unknown

⇒ T Interval

inpt: Stats

$\bar{x}=80.9$

$S=14.0$

$n=12$

C-level: .99

Calculate

Nov 14-9:05 AM

How to determine minimum Sample Size: n

Proportion

$$E = z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

with some algebra, we can isolate n.

$$n = \hat{p}\hat{q}\left(\frac{z_{\alpha/2}}{E}\right)^2$$

when decimal Always Round-up

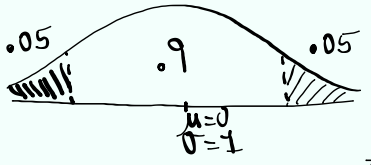
In case $\hat{p}$ & $\hat{q}$ are both unknown, use .5 for each

$$n = .25\left(\frac{z_{\alpha/2}}{E}\right)^2$$

Nov 14-9:14 AM

Find minimum Sample Size needed to Construct 90% Conf. interval for Pop. Prop. with margin of error not to exceed 6%.

1) Assume $\hat{p} = .4$



$z_{\alpha/2} = \text{invNorm}(.95, 0, 1) = 1.645$

$$n = \hat{p}\hat{q}\left(\frac{z_{\alpha/2}}{E}\right)^2 = (.4)(.6)\left(\frac{1.645}{.06}\right)^2 = 180.401\ldots$$

$n = 181$

2) Assume $\hat{p}$ & $\hat{q}$ are unknown

$$n = .25\left(\frac{z_{\alpha/2}}{E}\right)^2 = .25\left(\frac{1.645}{.06}\right)^2 = 187.918$$

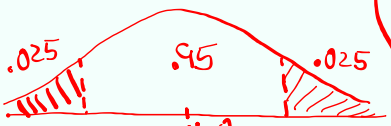
≈ 188

Nov 14-9:19 AM

Find minimum Sample Size needed to construct a NO C-level Conf. interval for pop. prop. and error not to exceed 8%.

$$n = \hat{p}\hat{q}\left(\frac{z_{\alpha/2}}{E}\right)^2$$

1) Assume $\hat{p} = .25$



$z_{\alpha/2} = \text{invNorm}(.975, 0, 1) = 1.960$

$$n = (.25)(.75)\left(\frac{1.960}{.08}\right)^2$$

$n = 112.54\ldots$

$n = 113$

2) Assume $\hat{p}$ & $\hat{q}$ are both unknown

$$n = .25\left(\frac{z_{\alpha/2}}{E}\right)^2 = .25\left(\frac{1.960}{.08}\right)^2 = 150.0625$$

$n = 151$

Nov 14-9:27 AM

How to determine minimum Sample Size: n

Population

$$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

with some algebra, we isolate n

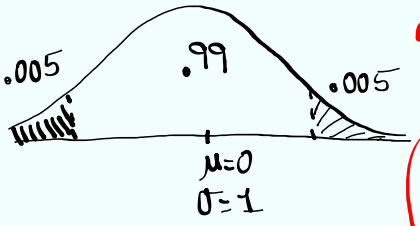
$$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$$

when decimal ⇒ Round-up

If σ is unknown, use S instead.

Nov 14-9:14 AM

Find minimum Sample Size needed to construct 99% Conf. interval for pop. mean with $\sigma = 25$ and $E = 10$.



$$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$$

$z_{\alpha/2} = \text{invNorm}(.995, 0, 1) = 2.576$

$$n = \left(\frac{2.576 \cdot 25}{10}\right)^2$$

$n = 41.4736$

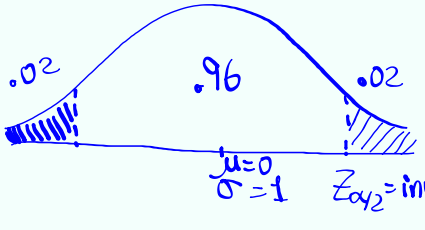
$n = 42$

Nov 14-9:36 AM

Find minimum Sample Size needed to Construct 96% Conf. interval for pop. mean and error not to exceed 8 assuming $S = 12.5$.

$$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$$

Since σ is unknown we use S instead.



$z_{\alpha/2} = \text{invNorm}(.98, 0, 1) = 2.054$

$$n = \left(\frac{2.054 \cdot 12.5}{8}\right)^2$$

$= 10.30\ldots$

$n = 11$

Nov 14-9:41 AM

I randomly selected 15 students, here are their ages:

27	32	18	40	20
30	25	34	19	18
24	29	36	42	30

Find

1) $\bar{x} = 28$

2) $s = 8$

} Round to whole #

3) Find Conf. interval for mean age of all students.

σ unknown → TInterval

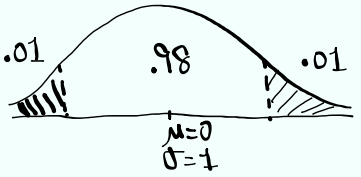
NO C-level → .95

$24 < \mu < 32$

$E = 4$

Nov 14-9:46 AM

4) Find minimum Sample Size needed to Construct 98% Conf. interval for mean age of all students and error not to exceed 2.5 Yrs.



$z_{\alpha/2} = \text{invNorm}(.99, 0, 1) = 2.326$

$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$ uses

$n = \left(\frac{2.326 \cdot 8}{2.5}\right)^2$

$n = 55.401\ldots$

If $E = 5$

$n = \left(\frac{2.326 \cdot 8}{5}\right)^2 \approx 14$

SG 22 & 23

$n = 56$

Nov 14-9:52 AM