

Statistics

Lecture 41



Feb 19-8:47 AM

Confidence Interval for population mean μ :

Point-estimate \bar{x}

$$\bar{x} - E < \mu < \bar{x} + E$$

Margin of error E

Case I: σ known

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

TI:

STAT TESTS Z Interval

inpt: stats

Nov 13-8:54 AM

A Sample of 25 College students had a mean age of 30 yrs.

$n = 25$
 $\bar{x} = 30$

C-level: .9
Find 90% Conf. interval for the mean age of all students if $\sigma = 8$.

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

$$= 1.645 \cdot \frac{8}{\sqrt{25}} = 2.6$$

$$\bar{x} - E < \mu < \bar{x} + E$$

$$30 - 2.6 < \mu < 30 + 2.6$$

$$27.4 < \mu < 32.6$$

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

STAT TESTS [Z Interval]
inpt: [stats]
 $\sigma = 8$
 $\bar{x} = 30$
 $n = 25$
C-level: .9
[Calculate]

$\bar{x} = \frac{33 + 27}{2} = 30$
 $E = \frac{33 - 27}{2} = 3$

we are 90% Confident that the mean age of all students is between 27 & 33.

Nov 13-8:57 AM

Salaries of all nurses are normally dist. with standard dev. of \$400. $\sigma = 400$

A Sample of 30 nurses had a mean Salary of \$7500/mo. $n = 30$ $\bar{x} = 7500$

C-level: .98
Find 98% Conf. Interval for the mean Salary of all nurses. $\bar{x} - E < \mu < \bar{x} + E$

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

$$= 2.326 \cdot \frac{400}{\sqrt{30}} = 170$$

$$7500 - 170 < \mu < 7500 + 170$$

$$7330 < \mu < 7670$$

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

STAT TESTS [Z Interval]
inpt: [stats]
 $\sigma = 400$
 $\bar{x} = 7500$
 $n = 30$
C-level: .98
[Calculate]

we are 98% Confident that mean salary of all nurses is between \$7330 & \$7670

$$E = \frac{7670 - 7330}{2} = 170$$

$$\bar{x} = \frac{7670 + 7330}{2} = 7500$$

Nov 13-9:10 AM

$\sigma = 12$

Standard deviation of all exam scores is 12.

A sample of 20 exams had a mean of 88.
 $n = 20$ $\bar{x} = 88$

Find confidence interval for the mean of all exams.

No C-level
use 95%

$82.741 < \mu < 93.259$

Since σ is known,
we use Z Interval

$83 < \mu < 93$

$E = \frac{93 - 83}{2} = 5$
 $\bar{x} = \frac{93 + 83}{2} = 88$

Nov 13-9:21 AM

Confidence Interval for population mean μ :

Point-estimate \bar{x} $\bar{x} - E < \mu < \bar{x} + E$

Margin of error E

Case I: σ known	Case II: σ unknown
$E = Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$	$E = t_{\alpha/2} \cdot \frac{s}{\sqrt{n}} \quad df = n - 1$
TI: <div style="border: 1px solid red; padding: 2px; display: inline-block;">STAT</div> <div style="border: 1px solid red; padding: 2px; display: inline-block;">TESTS</div> <div style="border: 1px solid red; padding: 2px; display: inline-block; background-color: yellow;">Z Interval</div> inpt: <div style="border: 1px solid black; padding: 2px; display: inline-block;">stats</div>	TI: <div style="border: 1px solid red; padding: 2px; display: inline-block;">STAT</div> <div style="border: 1px solid red; padding: 2px; display: inline-block;">TESTS</div> <div style="border: 1px solid red; padding: 2px; display: inline-block; background-color: cyan;">T Interval</div> inpt: <div style="border: 1px solid black; padding: 2px; display: inline-block;">Stats</div>

Nov 13-8:54 AM

Given: $n=15$ $\bar{x}=32.5$ $S=6.5$
 C-level: .98 σ unknown

Find Conf. interval for μ

$$E = t_{\alpha/2} \cdot \frac{S}{\sqrt{n}}$$

$$= 2.624 \cdot \frac{6.5}{\sqrt{15}} \approx 4.4$$

$$\bar{x} - E < \mu < \bar{x} + E$$

$$32.5 - 4.4 < \mu < 32.5 + 4.4$$

$$28.1 < \mu < 36.9$$

$$E = \frac{36.9 - 28.1}{2} = 4.4$$

$$\bar{x} = \frac{36.9 + 28.1}{2} = 32.5$$

$t_{\alpha/2} = \text{invT}(.99, 14) \approx 2.624$

TI:
 [STAT] [TESTS] [TInterval]
 inpt: [Stats]
 $\bar{x}=32.5$ $28.1 < \mu < 36.9$
 $S=6.5$
 $n=15$
 C-level: .98
 [Calculate]

Nov 13-9:34 AM

A sample of 12 teachers from LAUSD had a mean salary of \$7750 with standard deviation of \$450.

$n=12$ $\bar{x}=7750$
 $S=450$
 $df=11$

C-level: .99

Find [99% Conf. interval] for the mean salary of all teachers in LAUSD.

σ unknown \Rightarrow T Interval

[STAT] [TESTS] [TInterval]
 inpt: [Stats]
 $\bar{x}=7750$ $7347 < \mu < 8154$
 $S=450$
 $n=12$
 C-level: .99
 [Calculate]

$$E = \frac{8154 - 7347}{2} \approx 404$$

Since \bar{x} is a whole #, we round to whole #.

$$\bar{x} = \frac{8154 + 7347}{2} \approx 7751$$

Nov 13-9:45 AM