Statistics

Lecture 23

Feb 19-8:47 AM

Estimating Population Mean:

$$< \mu <$$

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

Sample Mean

Point-estimate

Margin of error

Case I: σ Known

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

Using TI:

$\boxed{\text{STAT}}$ → TESTS ↓

$\boxed{\text{ZInterval}}$

input: $\boxed{\text{Stats}}$

May 20-9:57 AM

Given : $n=25$, $\bar{x}=88$, $\sigma=15$, C-level = 98%

Find Conf. interval for Population Mean.

$\boxed{81 < \mu < 95}$

Z Interval

inpt: $\boxed{\text{Stats}}$

Round to whole

σ : 15

$\bar{x}=88$ ← Point-estimate is a whole #

$n=25$

C-level : .98

$\boxed{\text{Calculate}}$

$$E = \frac{95-81}{2} = \boxed{7}$$

$$\bar{x} = \frac{95+81}{2} = \boxed{88}$$

May 20-10:02 AM

I took a Sample of 20 Students, their mean age was 32.5 Yrs.

$n=20$

$\bar{x}=32.5$

C-level : .99

Find 99% Conf. interval for the mean age of all students assuming Standard deviation of ages of all Students is 9.5 Yrs.

$\sigma = 9.5$

$\boxed{27.0 < \mu < 38.0}$

σ Known → Z Interval

inpt: $\boxed{\text{Stats}}$

Round to 1-dec.

$\sigma=9.5$

$\bar{x}=32.5$ ← Point- estimate is 1-dec.

$n=20$

C-level : .99

$$E = \frac{38-27}{2} = 5.5$$

$$\bar{x} = \frac{38+27}{2} = 32.5$$

May 20-10:08 AM

Estimating Population Mean:

$$< \mu <$$

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

Sample Mean

Point-estimate

Margin of error

Case I: σ Known

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

Using TI:

$\boxed{\text{STAT}} \to$ TESTS ↓

$\boxed{\text{ZInterval}}$

inpt: $\boxed{\text{Stats}}$

Case II: σ unknown

$E = t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$, $df = n - 1$

Using TI:

$\boxed{\text{STAT}} \to$ TESTS ↓

$\boxed{\text{TInterval}}$

inpt: $\boxed{\text{Stats}}$

May 20-9:57 AM

Given: $n = 12$, $\bar{x} = 125$, $s = 20$

Find $\underbrace{\text{Conf. interval}}_{\text{no C-level} \to .95}$ for population Mean

$$\boxed{112 < \mu < 138}$$

Round to whole #

σ Unknown

→ TInterval

inpt: $\boxed{\text{Stats}}$

$\bar{x} = 125$ ← Point-estimate is a whole #

$s = 20$

$n = 12$

C-level: .95

$df = 12 - 1 = \boxed{11}$

$$E = \frac{138 - 112}{2} = \boxed{13}$$

$$\bar{x} = \frac{138 + 112}{2} = \boxed{125}$$

May 20-10:20 AM

I randomly Selected 10 exams, their mean Score was 88.4 with Standard dev. of 12.5.

$n = 10$, $\bar{x} = 88.4$, $S = 12.5$

C-level: .9

Find 90% Conf. interval for the mean of all exam Scores.

$\boxed{81.2 < \mu < 95.6}$

σ Unknown

→ T Interval

inpt: Stats

$\bar{x} = 88.4$

$S = 12.5$

$n = 10$

C-level = .9

1-dec.

$E = \frac{-}{2}$

$\bar{x} = \frac{+}{2}$

May 20-10:26 AM

I randomly Selected 12 nurses. Here are their ages:

32	45	30	25
48	50	60	55
40	28	52	60

Find

1) $\bar{x} = 43.75 \approx 44$

2) $S = 12.513 \approx 13$

} Round to whole #.

3) use the rounded answers to construct 99% Confidence Interval for the mean age of all nurses.

σ unknown → T Interval

$E = \frac{-}{2} = 12$

$\bar{x} = \frac{+}{2} = 44$

$\boxed{32 < \mu < 56}$

May 20-10:34 AM

How to find minimum Sample Size:

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

Solve for n

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

when decimal → Round-up

If σ is unknown → use S in place of σ:

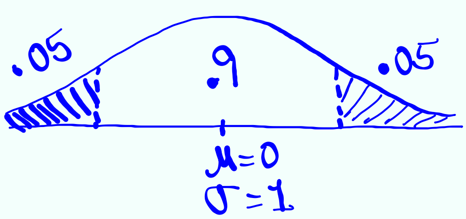
$$\boxed{n = \left(\frac{Z_{\alpha/2} \cdot S}{E}\right)^2}$$

May 20-10:43 AM

Given: 90% C-level, $\sigma = 20$, $E = 5$

Find n.

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



$Z_{.05} = \text{invNorm}(.95, 0, 1)$

$$= \left(\frac{1.645 \cdot 20}{5}\right)^2$$

$$= 43.2964$$

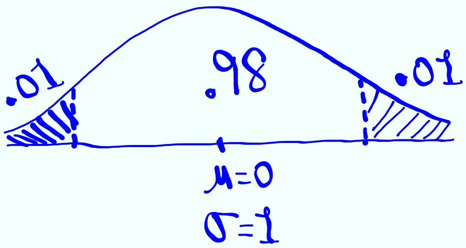
$$\boxed{n \approx 44}$$

May 20-10:47 AM

Given C-level: .98 $S = 25$ $E = 10$

Find n

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



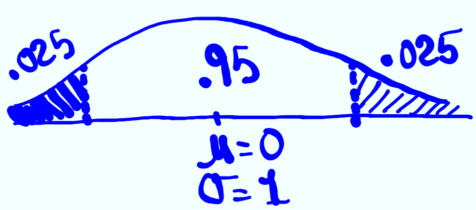
$$= \left(\frac{2.326 \cdot 25}{10}\right)^2$$

$z_{.01} = \text{invNorm}(.99, 0, 1)$ $= 33.814\ldots \approx \boxed{34}$

May 20-10:52 AM

Find min. Sample Size needed to construct (n) 95% Conf. interval for Pop. mean with $\sigma = 18$ and error not exceed 8 points.

$$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2 = \left(\frac{1.960 \cdot 18}{8}\right)^2 = 19.4481$$



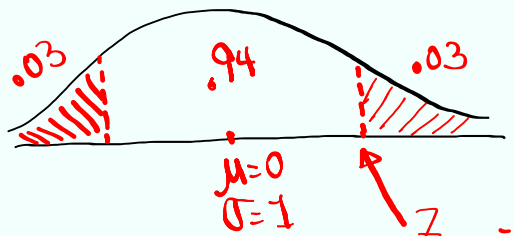
$n = 20$

$z_{.025} = \text{invNorm}(.975, 0, 1) \approx \boxed{1.960}$

May 20-10:57 AM

Class QZ 2

Complete the graph below for 94% C-level find $Z_{\alpha/2}$, round to 3-dec.



$Z_{.03} = \text{invNorm}(.97, 0, 1) \approx \boxed{1.881}$