Statistics

Lecture 22

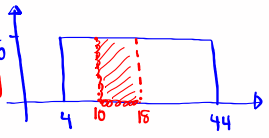
Feb 19-8:47 AM

Class Qz 12

Consider a uniform Prob. dist. for all values from 4 to 44. Drawing Required

1) Find $P(10 < x < 18)$

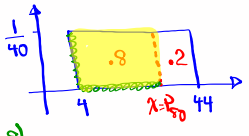
$= (18-10) \cdot \frac{1}{40} = \frac{8}{40} = \boxed{\frac{1}{5}} = \boxed{.2}$



2) Find $x = P_{80}$

80% below — Left Area .8

20% above — Right area .2



$(x-4) \cdot \frac{1}{40} = .8$

$x - 4 = 40(.8)$

$x - 4 = 32$

$\boxed{x = 36}$

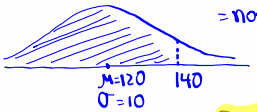
Nov 29-6:50 AM

Class Q7 11

Given $N(120, 10)$ (μ, σ) — Normal Prob. Dist.

Drawing, labeling, shading, and full TI-command needed.

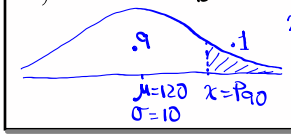
1) Find $P(x < 140)$



= normalcdf(-E99, 140, 120, 10)

= .977 ✓

2) Find $x = P_{90}$, Round to whole #.



$x = P_{90}$ = invNorm(.9, 120, 10)

= 132.816

≈ 133

Nov 28-9:37 AM

Given the confidence interval $.186 < p < .286$

1) Margin of error $E = \frac{.286 - .186}{2} = \frac{.1}{2} = .05$

2) Point-estimate $\hat{p} = \frac{.286 + .186}{2} = \frac{.472}{2} = .236$

In a survey of 450 students, 72% of them were fully vaccinated for covid-19.

1) How many of them were fully vaccinated?

$n = 450$

$\hat{p} = .72 \Rightarrow x = n\hat{p} = 450(.72) = 324$

if decimal → Round-up

2) Find Confidence interval for the prop. of all students that are fully vaccinated.

→ No C-level ⇒ use .95

1-PropZInt

$x = 324$, $n = 450$, C-level: .95

$E = \frac{.761 - .679}{2} = .041 \approx 4\%$

$\hat{p} = \frac{.761 + .679}{2} = .72 = 72\%$

$.679 < p < .761$

$.68 < p < .76$

we are 95% confident that between 68% and 76% of all students are fully vaccinated.

Nov 29-7:47 AM

Among 750 voters 312 of them were in support of tougher Gun Laws. $n=750$ $x=312$

1) Find the Sample proportion, write in whole %.

$\hat{p} = \frac{x}{n} = \frac{312}{750} = .416 \approx 42\%$

2) Find 99% Conf. interval for the prop. of all voters that feel the Same.

C-level: .99

1-PropZInt
$x=312$
$n=750$
C-level: .99

$E = \frac{.462 - .370}{2} = .046 \approx 5\%$

$\hat{p} = \frac{.462 + .370}{2} = .416 \approx 42\%$

$.370 < p < .462$

$.37 < p < .46$

we are 99% Confident that between 37% and 46% of all voters are in support of tougher Gun laws.

Nov 29-8:01 AM

Estimating One Population Mean

final Ans $\quad < \mu <$

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

$\bar{x}$: Sample Mean, Point-estimate

E: Margin of error

Case I: σ Known	
$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$	
TI Command: ZInterval	
inpt: Stats	

Nov 29-8:10 AM

Given: $\bar{x}=72$, $n=40$, $\sigma=12$, C-level: .9

Find Conf. interval for μ.

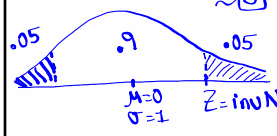
$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$

$= 1.645 \cdot \frac{12}{\sqrt{40}} = 3.121 \approx 3$

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

$72 - 3 < \mu < 72 + 3$

$69 < \mu < 75$



We are 90% Confident that Pop. mean is between 69 & 75.

now using TI

68.879 < μ < 75.121

Z Interval

inpt: Stats

σ=12

x̄=72

n=40

C-level: .9

whole

69 < μ < 75

$E = \frac{75-69}{2} = \frac{6}{2} = 3$

$\bar{x} = \frac{75+69}{2} = \frac{144}{2} = 72$

Nov 29-8:14 AM

I randomly selected 32 students and their mean age was 33.6 Yrs.

n=32

x̄=33.6

It is known from other studies that Standard deviation of ages of all students is 8.5 Yrs.

σ=8.5

Find 98% Conf. interval for the mean age of all Students.

C-level: .98

30.104 < μ < 37.096

Since σ is known ⇒ Z Interval

inpt: Stats

σ:8.5

x̄:33.6

n:32

C-level: .98

1-decimal

30.1 < μ < 37.1

$E = \frac{37.1-30.1}{2} = 3.5$

$\bar{x} = \frac{37.1+30.1}{2} = 33.6$

We are 98% Confident that the mean age of all students is between 30.1 & 37.1 Yrs.

Nov 29-8:24 AM

Estimating One Population Mean

Final Ans $\quad < \mu <$

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

$\bar{x}$: Sample Mean, Point-estimate

E: Margin of error

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 Command: ZInterval	TI Command: TInterval
inpt: Stats	inpt: STATS

Nov 29-8:10 AM

Given $n=10$, $\bar{x}=75$, $s=8$, C-level: .9 $\quad df = n-1 = 9$

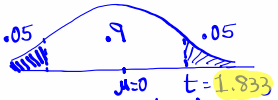
Find Conf. interval for μ. $\quad E = t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$

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

$= 1.833 \cdot \frac{8}{\sqrt{10}} = 4.637 \approx 5$

$75 - 5 < \mu < 75 + 5$

$70 < \mu < 80$



Now TI Command

TInterval

inpt: Stats

$\bar{x}=75$

$s=8$

$n=10$

C-level: .9

$t = \text{invT}(.95, 9) = 1.833$

$70.363 < \mu < 79.637$ whole $\rightarrow 70 < \mu < 80$

$E = \frac{80-70}{2} = 5$

$\bar{x} = \frac{80+70}{2} = 75$

Nov 29-8:38 AM

I randomly selected 12 exams, their mean score was 86.5 with standard dev. of 9.4.

$n=12$, $\bar{x}=86.5$, $s=9.4$

Find Conf. interval for the mean score of all exams.

NO C-level ⇒ use .95

$80.528 < \mu < 92.472$

$80.5 < \mu < 92.5$

σ known → Z Interval

σ unknown → T Interval

inpt: Stats

$\bar{x}=86.5$ ← 1-decimal

$s=9.4$

$n=12$

C-level: .95

$E = \frac{92.5 - 80.5}{2} = 6$

$\bar{x} = \frac{92.5 + 80.5}{2} = 86.5$

Nov 29-9:01 AM

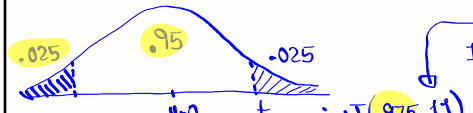
Find $t_{\alpha/2}$ for 95% C-level when constructing Conf. int. for pop. mean with $n=12$.

$df = n-1$

$= 11$

$1 - .95 = .05$

$.05 \div 2 = .025$



$t_{.025} = \text{invT}(.975, 11)$

σ unknown

$df = 11$

$= 2.201$

Nov 29-9:10 AM

I randomly selected 10 teachers from LAUSD.

Here are their ages:

45	52	36	28	40
48	50	60	55	30

1) Store in L1, use [1-Var Stats] with L1 to find

$\bar{x} = 44.4$ } Round to 1 dec.

$S = 10.7$ } Round to 1 dec.

$S^2 = \frac{5122}{45}$ } Red. Frac.

2) Find 90% Conf. interval for the mean age of all teachers in LAUSD.

If σ known $\Rightarrow$ Z Interval

If σ unknown $\Rightarrow$ T Interval

Inpt: [Stats]

$\bar{x} = 44.4$

$S = 10.7$

$n = 10$

C-level: .9

$38.197 < \mu < 50.603$

$38.2 < \mu < 50.6$ (1 decimal)

$E = \frac{50.6 - 38.2}{2} = 6.2$

$\bar{x} = \frac{50.6 + 38.2}{2} = 44.4$

We are 90% Confident that the mean age of all teachers in LAUSD is between 38.2 & 50.6 yrs.

Nov 29-9:13 AM

Class QZ 13:

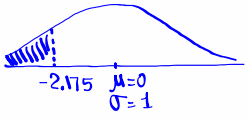
Drawing, labeling, shading, and full TI command required.

1) Find twice the area to the left of $Z = -2.175$.

2*normalcdf(-E99, -2.175, 0, 1)

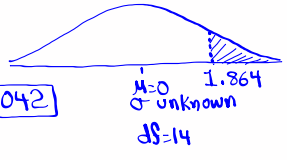
$= .0296$

$\approx .030$



2) Find the area to the right of $t = 1.864$ with $df = 14$.

tcdf(1.864, E99, 14) = .042



Nov 29-9:27 AM