Statistics
Spring 2023
Lecture 39

Feb 19-8:47 AM

1) Find $z_{\alpha/2}$ for 98% Conf. level.

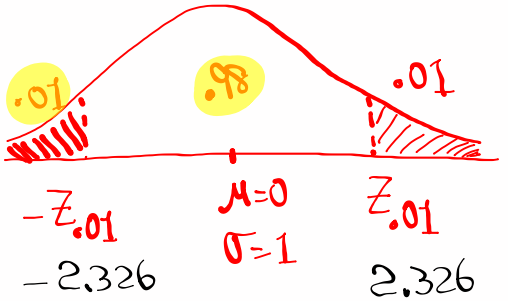
Middle Area = .98

Sec 22 & Sec 23

$z_{\alpha/2}$ ↑ N(0, 1)

$1 - .98 = .02$ ← α

$.02 \div 2 = .01$ ← $\alpha/2$



$z_{.01} = \text{invNorm}(.99, 0, 1) = 2.326$

Apr 25-7:16 AM

Find $z_{\alpha/2}$ for $\alpha = .05$.

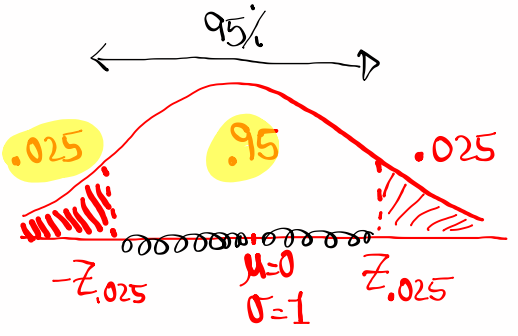
Conf. level $(1-\alpha)\cdot 100\% = (1-.05)\cdot 100\% = 95\%$

Middle Area = .95

$\alpha/2 = .05/2 = .025$

↑ Area on each tail

$N(0,1)$



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

Apr 25-7:20 AM

Estimating parameters → Range of values

Confidence Interval

Constructing Conf. Interval for population Proportion

Ans: $<p<$ ← Sample Proportion, Point-estimate

Format $\hat{p} - E < p < \hat{p} + E$ ← Margin of error

$\hat{p} = \frac{x}{n}$ ← # of favorable responses; ← Sample Size

$\hat{q} = 1 - \hat{p}$

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

$z_{\alpha/2}$ is the Critical Value for $(1-\alpha)\cdot 100\%$ C-level.

Given $n = 100$, $x = 80$, C-level: 90%.

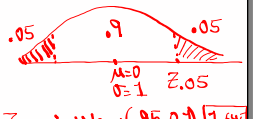
$\hat{p} = \frac{x}{n} = \frac{80}{100} = \boxed{.8}$

$\hat{q} = 1 - \hat{p} = 1 - .8 = \boxed{.2}$

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

$= 1.645 \cdot \sqrt{\frac{(.8)(.2)}{100}}$

$\approx .066$



$z_{.05} = \text{invNorm}(.95, 0, 1) = \boxed{1.645}$

$\hat{p} - E < p < \hat{p} + E$

$.8 - .066 < p < .8 + .066$

$\boxed{.734 < p < .866}$

$73\% < p < 87\%$

Apr 25-7:25 AM

In a Survey of 250 randomly selected students, 190 of them had iPhone.

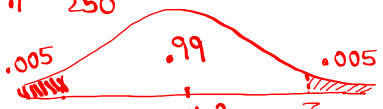
Find 99% Conf. interval for the prop. of all students that have iPhone.

$n = 250$

$x = 190$

$\hat{p} = \frac{x}{n} = \frac{190}{250} = .76$ $\quad \hat{q} = 1 - \hat{p} = .24$

C-level: .99



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

$= 2.576 \cdot \sqrt{\frac{(.76)(.24)}{250}} \approx .070$

$\hat{p} - E < p < \hat{p} + E$

$.76 - .07 < p < .76 + .07$

$.69 < p < .83$

$69\% < p < 83\%$

We are 99% Confident that between 69% & 83% of all students have iPhone.

Apr 25-7:36 AM

Using TI Command:

STAT → TESTS ↓ 1-PropZInt

x: 190

n: 250

C-level: .99

Calculate

(.69042, .82958)

$.690 < p < .830$

$E = \frac{.830 - .690}{2}$

$= .07$

$\hat{p} = \frac{.830 + .690}{2}$

$= .76$

Apr 25-7:45 AM

In a survey of 300 voters, 62% of them were in a favor of tougher gun laws.

Find 90% conf. interval for the prop. of all voters that favor tougher gun laws.

$n = 300$

$\hat{p} = .62$

C-level: .9

$\hat{p} = \frac{x}{n}$ Cross-Multiply $x = n\hat{p}$

$x = n\hat{p} = 300(.62) = 186$

if decimal, Always Roundup

$.574 < p < .666$

1-PropZInt

x: 186

n: 300

C-level: .9

Calculate

$57\% < p < 67\%$

we are 90% confident that between 57% and 67% of all voters are in support of tougher gun laws.

$E = \frac{.666 - .574}{2} = .046$

$\hat{p} = \frac{.666 + .574}{2} = .62$

Apr 25-7:52 AM

46% of 185 students randomly selected were in support of online classes with Zoom meeting.

$n = 185$ $\hat{p} = .46$

$x = n\hat{p} = 185(.46) = 85.1$

$x = 86$

Always Round-up

Find conf. interval for the prop. of all students in support of online classes with Zoom meeting.

No C-level use .95

$.393 < p < .537$

1-PropZInt

x: 86

n: 185

C-level: .95

Calculate

$39\% < p < 54\%$

we are 95% confident that 39% to 54% of all students are in support of online classes with Zoom meetings.

$E = \frac{.537 - .393}{2} = .072 \approx 7\%$

$\hat{p} = \frac{.537 + .393}{2} = .465 \approx 47\%$

Apr 25-8:06 AM

Given: $.438 < p < .634$

1) Find the margin of error

$$E = \frac{.634 - .438}{2} = \boxed{.098}$$

2) Find the point-estimate

$$\hat{p} = \frac{.634 + .438}{2} = \boxed{.536}$$

Exam II: Next Tuesday

It is from SG 1 to SG 21

Apr 25-8:16 AM