Final Exam

Thurs May 17th at 8:00

OR Mon May 21st at 9:45

interval $= \bar{x} \pm z\,\sigma_{\bar{x}}$

$$E = z\,\sigma_{\bar{x}}$$

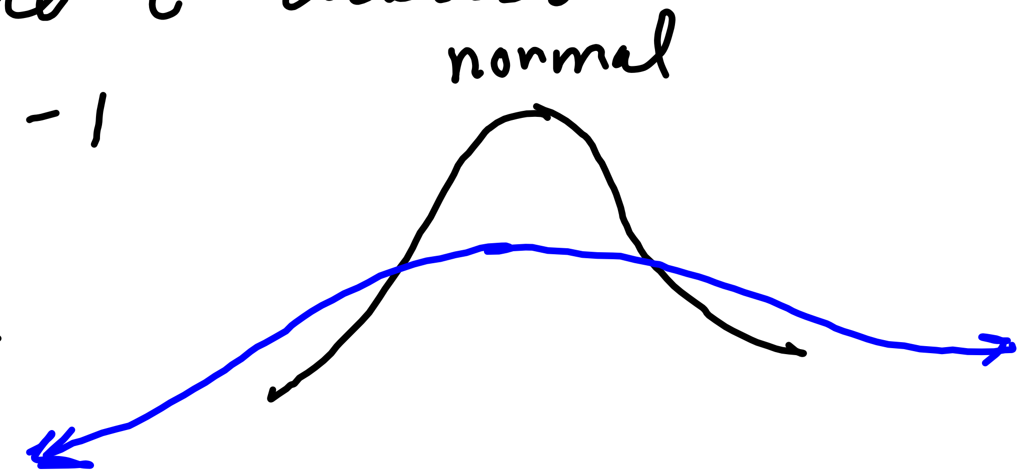
$$E = z\,\frac{\sigma}{\sqrt{n}}$$

Now - don't have σ

Must use the t-distribution

$$df = n - 1$$

$$\sigma = \sqrt{\frac{df}{df-2}}$$



5 values

avg 15

$$(\cancel{5})\frac{\text{total}}{\cancel{5}} = 15(5)$$

$$\text{total} = 75$$

5th # must be 16

If we freely choose

10, 17, 24, 8

So 4 degrees of freedom

choose 4 total

17, 20, 6, 9 52

$75 - 52 = 23$

$n = 5 \quad df = 5 - 1 = 4$

$$\sigma_t = \sqrt{\frac{14}{12}}$$

14 df
$n = 15$

≈ 1.080 <u>remember</u>
always > one.

EX 8-4 area in right tail = .05
need area to the left of t

$n = 17$
$df = 16$

$t = \text{invT}(.95, 16)$

≈ 1.74588

invT (area to left, df)

Use t-dist when we don't know σ

s standard deviation for sample

$$S_{\bar{x}} = \frac{s}{\sqrt{n}}$$

$$\bar{x} \pm t\, S_{\bar{x}}$$

$$S_{\bar{x}} = \frac{s}{\sqrt{n}}$$

$$E = t\, s_{\bar{x}}$$

EX 8-5

sample $n = 25$

$df = 24$

$\bar{x} = 186$

$s = 12$

normally distributed

95% conf. interval

$\alpha = .05 \qquad \frac{\alpha}{2} = .025$

$1 - .025 = .975$

$t = \text{invT}(.975, 24)$

≈ 2.06389

≈ 2.0639

$s_{\bar{x}} = \frac{12}{\sqrt{25}} \approx 2.4$

$t s_{\bar{x}} = 2.0639(2.4)$

≈ 4.95336

≈ 4.96 round up

$186 - 4.96 = 181.04$

$186 + 4.96 = 190.96$

$(181.04, 190.96)$ 95% conf. interval

EX 8-6 r.s. $64 = n$

$\bar{x} = \$1450$ on books / year

$S = \$300$

We want 99% conf interval

$df = 63$

$1 - .99 = \alpha$

$S_{\bar{x}} = \frac{300}{\sqrt{64}} = 37.5$

$\alpha = .01$

$\frac{\alpha}{2} = .005$

$1 - .01 = .99$

$t = \text{invT}(.005, 63)$

≈ -2.6562

$t = \text{invT}(.995, 63)$

$= 2.6562$

$1 - .99$

$\alpha = .01$

$\frac{\alpha}{2} = .005$

$E = t S_{\bar{x}}$

$E = 2.6562(37.50)$

≈ 99.6075

≈ 99.61

$1450 - 99.61 = 1350.39$

$1450 + 99.61 = 1549.61$

99% conf interval

$(1350.39, 1549.61)$

$\boxed{8.5}$ Estimation of p

we use $\hat{p}$, to find

$$S_{\hat{p}} = \sqrt{\frac{\hat{p}\hat{q}}{n}} \qquad \hat{q} = 1 - \hat{p}$$

$\hat{p}$ - point estimator

margin of error

$$E = z S_{\hat{p}} \qquad S_{\hat{p}} = \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

EX 8-7

$n = 1506$

75% have sleep problems

a) point estimate of p

$\hat{p} = .75$

b) Find a 99% conf interval

$\hat{q} = .25$

$\alpha = 1 - .99 = .01$

$\frac{\alpha}{2} = .005$

$s_{\hat{p}} = \sqrt{\frac{(.75)(.25)}{1506}}$

$\approx .011158$

$z = \text{invNorm}(.005, 0, 1)$

≈ -2.5758

$E = 2.5758(.011158)$

$\approx .0287412$

$\approx .0288$ round up

$.75 - .0288 = .7212$ OR 72.12%

$.75 + .0288 = .7788$ 77.88%

(72.12%, 77.88%)

99% conf interval

$$E = z s_{\hat{p}}$$

$$(E)^2 = \left(z\sqrt{\frac{\hat{p}\hat{q}}{n}}\right)^2$$

$$(n)E^2 = z^2 \frac{\hat{p}\hat{q}}{n}(n)$$

$$\frac{nE^2}{E^2} = \frac{z^2\hat{p}\hat{q}}{E^2}$$

$$n = \frac{z^2\hat{p}\hat{q}}{E^2}$$

Ex 8-9 new machine

within .02

$E = .02$

95% $1-\alpha = .95$

$\alpha = .05$

$\frac{\alpha}{2} = .025$

$\hat{p} \pm .02$

$\hat{p} = .50$

$\hat{p}\hat{q} = .25$

$Z = 1.9600$

$$n = \frac{(1.96)^2(.5)(.5)}{(.02)^2}$$

≈ 2401

$p = .5$

$1-p = .5$