Statistics

Lecture 25

Feb 19-8:47 AM

Use the chart below

~~No~~ α ~~= .05~~

to test the claim that

$\boxed{\sigma_1 > \sigma_2}$. H_1

$H_0: \sigma_1 \le \sigma_2$

$H_1: \sigma_1 > \sigma_2$ claim, RTT

Sample 1	Sample 2
$n_1 = 8$	$n_2 = 6$
$S_1 = 12$	$S_2 = 10$

1) $S_1 > S_2$

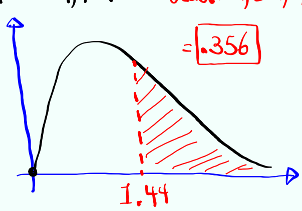
2) $Ndf = n_1 - 1 = 7$

$Ddf = n_2 - 1 = 5$

3) CTS $F = \frac{S_1^2}{S_2^2} = \frac{12^2}{10^2} = 1.44$

4) P-Value = Fcdf(1.44, E99, 7, 5)

$= \boxed{.356}$



P-Value $> \alpha$

H_0 valid, H_1 invalid

Invalid claim

Reject the claim

Use 2-SampFTest for $\sigma_1 > \sigma_2$

CTS $F = 1.44$

P-Value $P = .356$

Jun 3-1:49 PM

Given the chart below

Group 1	Group 2
$x_1 = 52$	$x_2 = 28$
$n_1 = 120$	$n_2 = 80$

$\hat{p}_1 = \frac{x_1}{n_1} = \frac{52}{120} = .433$

$\hat{p}_2 = \frac{x_2}{n_2} = \frac{28}{80} = .35$

Pooled Prop. $\bar{p} = \frac{x_1 + x_2}{n_1 + n_2} = \frac{52+28}{120+80} = \frac{80}{200} = \boxed{.4}$

.95

Find conf. interval for $P_1 - P_2$.

2-PropZInt

$\boxed{-.05 < P_1 - P_2 < .22}$

$E = \frac{.22 - (-.05)}{2} = \frac{.27}{2}$

$= \boxed{.135}$

Jun 3-1:59 PM

Test the claim that $P_1 = P_2$.

No $\alpha \rightarrow .05$

H_0

$H_0: P_1 = P_2$ claim

$H_1: P_1 \neq P_2$ TTT

2-PropZTest

$\boxed{\text{CTS } Z = 1.179 \quad \text{P-Value } P = .239}$

P-Value $> \alpha$

H_0 valid, H_1 invalid

Valid claim $\longrightarrow$ FTR the claim

Jun 3-2:05 PM

Use the chart below

Sample 1	Sample 2
$n_1 = 35$	$n_2 = 32$
$\bar{x}_1 = 42$	$\bar{x}_2 = 36$
$\sigma_1 = 10$	$\sigma_2 = 8$

1) Find 99% Conf. interval for $\mu_1 - \mu_2$.

σ_1 & σ_2 Known
$\to$ 2-SampZInt

$\boxed{0 < \mu_1 - \mu_2 < 12}$

$E = \frac{12-0}{2} = 6$

No $\alpha \to .05$

2) Test the claim that $\mu_1 = \mu_2$.

$\boxed{H_0: \mu_1 = \mu_2 \text{ claim}}$

$H_1: \mu_1 \neq \mu_2$ TTT

σ_1 & σ_2 Known $\to$ 2-SampZTest

CTS $Z = 2.722$
P-Value $P = .006$

P-Value $\leq \alpha$

$\boxed{H_0 \text{ invalid}}$ H_1 Valid

Invalid claim

Reject the claim

Jun 3-2:10 PM

Use the chart below

Sample 1	Sample 2
$\bar{x}_1 = 38$	$\bar{x}_2 = 35$
$S_1 = 10$	$S_2 = 8$
$n_1 = 10$	$n_2 = 12$

Assume $\sigma_1 = \sigma_2$

Poold: Yes

$df = n_1 + n_2 - 2 = 20$

Find 90% conf. interval for $\mu_1 - \mu_2$.

2-SamptInt

$\boxed{-4 < \mu_1 - \mu_2 < 10}$

$E = \frac{10-(-4)}{2} = \boxed{7}$

No $\alpha \to .05$

Test the claim that $\mu_1 = \mu_2$.

H_0

$H_0: \mu_1 = \mu_2$ claim

$H_1: \mu_1 \neq \mu_2$ TTT

2-SampTTest

CTS $t = .782$

P-Value $P = .443 > \alpha$

H_0 Valid, H_1 invalid

Valid claim

FTR the claim

Jun 3-2:19 PM

Use the chart below

Sample 1	Sample 2
$\bar{x}_1 = 78$	$\bar{x}_2 = 85$
$S_1 = 15$	$S_2 = 8$
$n_1 = 10$	$n_2 = 12$

Assume $\sigma_1 \neq \sigma_2$

Pooled: NO

df = Smaller $n - 1 = 9$

Find 98% Conf. interval for $\mu_1 - \mu_2$.

2-SampTInt

$\boxed{-21 < \mu_1 - \mu_2 < 7}$

$E = \frac{7-(-21)}{2} = 14$

Jun 3-2:27 PM

Use $\alpha = .1$ to test the claim that $\mu_1 < \mu_2$.

H_1

H_0: $\mu_1 \geq \mu_2$

H_1: $\mu_1 < \mu_2$ Claim, LTT

2-SampTTest

CTS $t = -1.327$

P-Value $P = .104 > \alpha$

H_0 valid

Invalid claim $\longrightarrow$ H_1 invalid

Reject the claim

Jun 3-2:31 PM

Comparing at least 3 pop. means: (SG 33)

Method: ANOVA (Analysis of Variance)

$H_0: \mu_1 = \mu_2 = \mu_3 = \dots = \mu_K$

H_1: At least one mean is different. $\boxed{RTT}$

K → # of groups ⇒ NDF = K − 1 ⇒ CTS F

n → Total Sample Size ⇒ DDF = n − K ⇒ P-Value P

$\boxed{\text{STAT}}$ → $\boxed{\text{TESTS}}$ $\boxed{\uparrow}$ $\boxed{\text{ANOVA(L1, L2, L3,}}$. $\boxed{\text{Enter}}$

P-Value $> \alpha$	H_0 Valid, H_1 invalid
P-Value $\le \alpha$	H_0 invalid, H_1 Valid

Jun 3-2:37 PM

I randomly Selected exams from 3 classes. Here are the Scores:

Morning L1			Evening L2			Online L3		
75	82	90	73	85	95	84	95	99
80	68	100	65	78	88	50	65	70
	88			100				

K = 3 n = 7 + 7 + 6 = 20 NDF = K − 1 = 2

DDF = n − K = 17

No α → .05

Test the claim that all means are equal.

$H_0: \mu_1 = \mu_2 = \mu_3$ claim

H_1: At least one mean is different. RTT

$\boxed{\text{STAT}}$ $\boxed{\text{TESTS}}$ $\boxed{\text{ANOVA(}}$ L1, L2, L3 $\boxed{\text{enter}}$

$\boxed{\begin{array}{l}\text{CTS } F = .409 \\ \text{P-Value } P = .671\end{array}}$

P-Value $> \alpha$

H_0 Valid, H_1 invalid

Valid claim

FTR the claim

Jun 3-2:55 PM

Students randomly selected from 4 schools.

Here are their ages:

L1 ELAC		L2 Mt. SAC		L3 Glendale		L4 USC	
21	28	19	25	20	25	28	33
18	30	32	35	30	35	45	38
32		20		18		50	

$K=4$ $n=5+5+5+5=20$ $NdF=K-1=3$

~~No $\alpha=.05$~~ $DdF=n-K=16$

Test the claim that not all means are equal.

$H_0: \mu_1=\mu_2=\mu_3=\mu_4$

claim

H_1: At least one mean is different. RTT

Use ANOVA Since we compare at least 3 means

CTS $F=3.898$

P-Value $P=.029$

ANOVA(L1, L2, L3, L4)

P-Value $\leq \alpha$

H_0 invalid H_1 Valid

Valid claim

FTR the claim

If we choose $\alpha=.02$ or $.01$

P-Value $> \alpha$

H_0 valid, H_1 invalid

Invalid claim

Reject the claim

Jun 3-3:05 PM

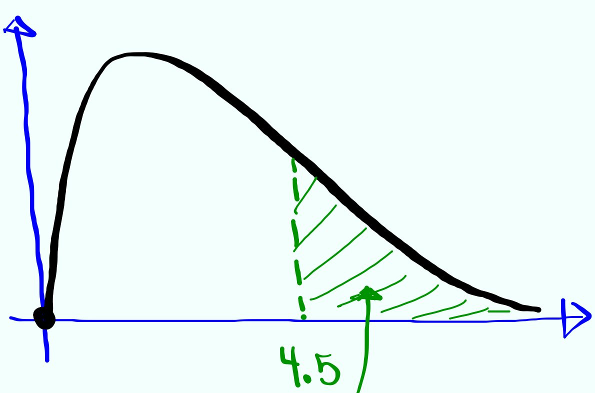
Suppose $K=5$, $n=25$, CTS $F=4.5$

Find P-Value

$NdF=K-1=4$

$DdF=n-K=20$

RTT (ANOVA)



P-Value = Fcdf(4.5, E99, 4, 20)

$= \boxed{.009}$

Jun 3-3:20 PM