Statistics
Spring 2023
Lecture 53

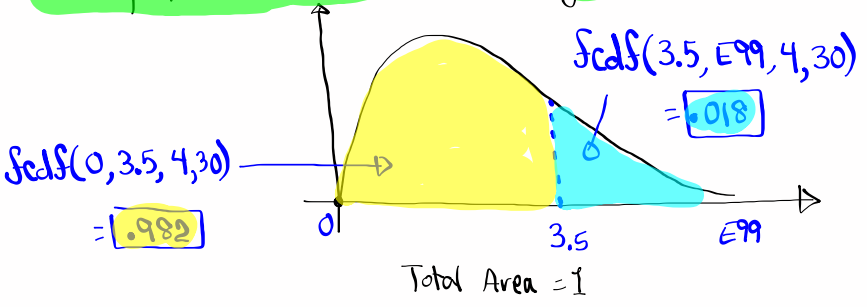
Feb 19-8:47 AM

Class Qz 13

Given $F=3.5$, $Ndf:4$, $Ddf=30$

Find the area on each side of $F=3.5$

multiply the smaller area by 2.



2 * Smaller area = 2(.018)

= .036

May 17-8:23 AM

SG 31

Comparing two Population Standard deviations:

$H_0: \sigma_1 = \sigma_2$ $H_1: \sigma_1 \neq \sigma_2$ TTT

$H_0: \sigma_1 \geq \sigma_2$ $H_1: \sigma_1 < \sigma_2$ LTT

$H_0: \sigma_1 \leq \sigma_2$ $H_1: \sigma_1 > \sigma_2$ RTT

Sample 1	Sample 2
n_1	n_2
S_1	S_2

$S_1 > S_2$

$Ndf = n_1 - 1$

$Ddf = n_2 - 1$

CTS $F = \frac{S_1^2}{S_2^2}$

use 2-SampFTest to find CTS F & P-value P.

P-Value method

P-Value $> \alpha \rightarrow H_0$ valid, H_1 invalid

P-Value $\leq \alpha \rightarrow H_0$ invalid, H_1 valid

Final Conclusion must be about claim.

Reject the claim OR FTR the claim

May 18-7:32 AM

Use the chart below to test the claim $\sigma_1 = \sigma_2$.

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

Verify $S_1 > S_2$ ✓

$Ndf = n_1 - 1 = 9$

$Ddf = n_2 - 1 = 7$

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

$H_0: \sigma_1 = \sigma_2$ claim

$H_1: \sigma_1 \neq \sigma_2$ TTT

2-Samp F Test

STAT TESTS

Inpt: Stats

$S_1 = 12$

$n_1 = 10$

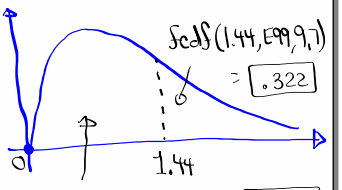
$S_2 = 10$

$n_2 = 8$

$\sigma_1 \neq \sigma_2$

CTS F = 1.44

P-value P = .645



fcdf(0,1.44,9,7) = .678

P-value = 2 * Smaller area

= 2 * .322

= .644 ✓

P-value $> \alpha$ — NO $\alpha \rightarrow$ use .05

H_0 valid, H_1 invalid

Valid claim

FTR the claim

May 18-7:41 AM

Given

Females: $n=12$, $S=9$ } which group becomes Sample 1? Remember $S_1 > S_2$

Males: $n=15$, $S=5$ }

Test the claim that two pop. Standard deviations are not equal using $\alpha=.02$

Females	Males
$n_1=12$	$n_2=15$
$S_1=9$	$S_2=5$

$S_1 > S_2$

$H_0: \sigma_1 = \sigma_2$

$H_1: \sigma_1 \neq \sigma_2$ claim

2-Samp F Test

inpt: Stats

$S_1=9$

$n_1=12$

$S_2=5$

$n_2=15$

$\sigma_1 \neq \sigma_2$

CTS $F=3.24$

P-value $P=.042$

P-value $>$ α $\Rightarrow$ H_0 valid, H_1 invalid

.042 .02

Invalid claim

Reject the claim.

If I choose $\alpha=.05, .06, .07, \ldots .1$

then P-value $\leq \alpha$

H_0 invalid, H_1 valid

Valid claim $\Rightarrow$ FTR the claim

May 18-7:51 AM

Morning class: $n=10$, $\bar{x}=80$, $S=7$

Evening class: $n=10$, $\bar{x}=85$, $S=10$

1) Which class becomes Sample 1? why?

Evening class because greater S

Evening	Morning
$n=10$	$n=10$
$S=10$	$S=7$

2) Use $\alpha=.1$ to test the claim that $\sigma_1 > \sigma_2$.

$H_0: \sigma_1 \leq \sigma_2$

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

CTS $F=2.041$

P-value $P=.151$ ✓

P-value $>$ α

.151 .1

H_0 valid H_1 invalid $\Rightarrow$ Invalid claim $\Rightarrow$ Reject the claim

2-Samp F Test

inpt: STATS

$S_1=10$

$n_1=10$ $df=n_1-1=9$

$S_2=7$

$n_2=10$ $df=n_2-1=9$

$\sigma_1 > \sigma_2$

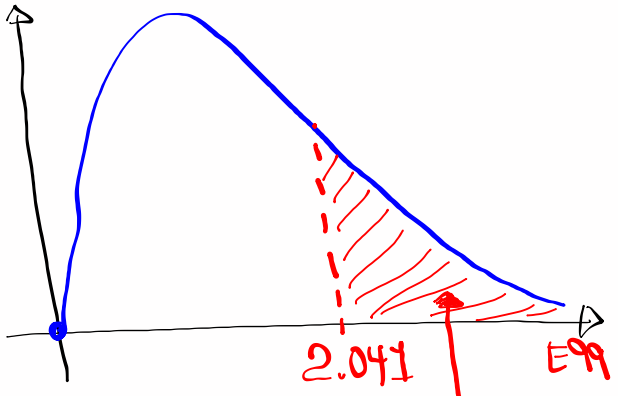
If we choose $\alpha=.16, .17, .18, \ldots, .2, \ldots$

then P-value $\leq \alpha$, H_0 invalid, H_1 valid $\Rightarrow$ Valid claim $\Rightarrow$ FTR the claim

May 18-8:03 AM

Given CTS F=2.041 , RTT , Ndf=9, Ddf=9

Find P-value



P-value = Area

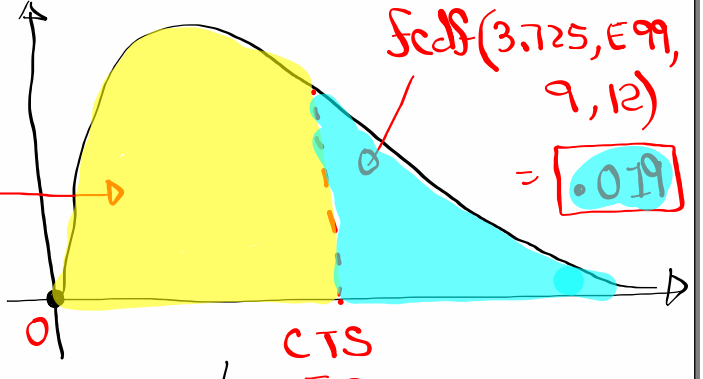
= fcdf(2.041, E99, 9, 9)

= .151

May 18-8:14 AM

Given CTS F=3.725 , TTT, Ndf=9, Ddf=12

Find P-value



Total Area = .981 + .019 = 1 ✓

P-value = 2 * Smaller area

= 2 * (.019) = .038

SG 31

May 18-8:17 AM