Statistics
Spring 2023
Lecture 55

Feb 19-8:47 AM

SG 35

Comparing at least 3 Pop. Means:

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

H_1: At least one mean is different. RTT

$K \rightarrow$ # of Samples $\quad K-1 = Ndf$

$n \rightarrow$ Total Sample Size $\quad n-K = Ddf$

Store each Sample into a list.

CTS F
P-Value P $\Rightarrow$ ANOVA(L1, L2, L3, ...

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 23-7:16 AM

Chart below shows ages of students from 3 different colleges:

ELAC			Mt. SAC			Chaffey		
28	32	40	22	34	45	17	34	45
18	25	20	18	19	25	20	24	
	30	24		26			19	

$K=3$ $\quad n=8+7+6=21$ $\Rightarrow$ $NdF=K-1=2$, $DdF=n-K=18$

use $\alpha=.1$ to test the claim that all Pop. means are equal.

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

H_1: At least one mean is different. RTT

ELAC $\rightarrow$ L1, Mt.SAC $\rightarrow$ L2, Chaffey $\rightarrow$ L3

STAT TESTS ANOVA(L1, L2, L3 Enter

CTS $F=.009$ $\quad$ P-value $>\alpha$ $\quad$ Valid claim

P-value $P=.991$ $\quad$ H_0 valid, H_1 invalid $\quad$ FTR the claim

May 23-7:23 AM

I randomly selected exams from four different classes:

L1 Morning		L2 Afternoon		L3 Evening		L4 Online		
72	85	70	88	78	82	86	90	92
90	100	92	98	94	90	88	78	100
	80		65		60		100	95

Clear all lists, store these scores in L1, L2, L3, and L4

$K=4$ $\quad n=5+5+5+8=23$ $\Rightarrow$ $NdF=K-1=3$, $DdF=n-K=19$

use $\alpha=.01$ to test the claim that all pop. means are the same.

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

H_1: At least one pop. mean is different. RTT

ANOVA(L1, L2, L3, L4)

CTS $F=1.088$

P-value $P=.378$ ✓

P-value $>\alpha$ $\quad .378 > .01$

H_0 valid

H_1 invalid

Valid claim

FTR the claim

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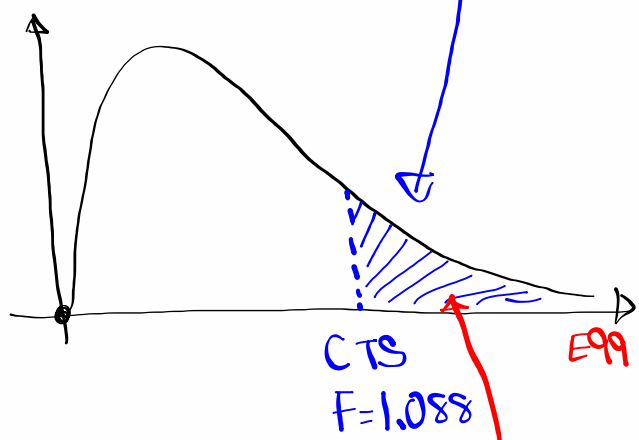
CTS $F = 1.088$, $Ndf = 3$, $Ddf = 19$, RTT

find P-Value.

SG 35 ✓



P-Value = Area

$= fcdf(1.088, E99, 3, 19)$

$= \boxed{.378}$

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Example for SG 31

No $\alpha \to .05$

use the chart below to test the claim that $\sigma_1 \neq \sigma_2$.

Sample 1	Sample 2
$n_1 = 10$	$n_2 = 12$
$S_1 = 15$	$S_2 = 5$

Ndf = 9

Ddf = 11

1) Is $S_1 > S_2$? ✓

2) CTS Formula

$F = \frac{S_1^2}{S_2^2} = \frac{15^2}{5^2} = 9$

3) $H_0: \sigma_1 = \sigma_2$

$H_1: \sigma_1 \neq \sigma_2$ claim, TTT

4) CTS $F = 9$

P-Value $P = .001$

2-Samp F Test

5) P-Value $\leq \alpha$

.001 .05

H_0 invalid

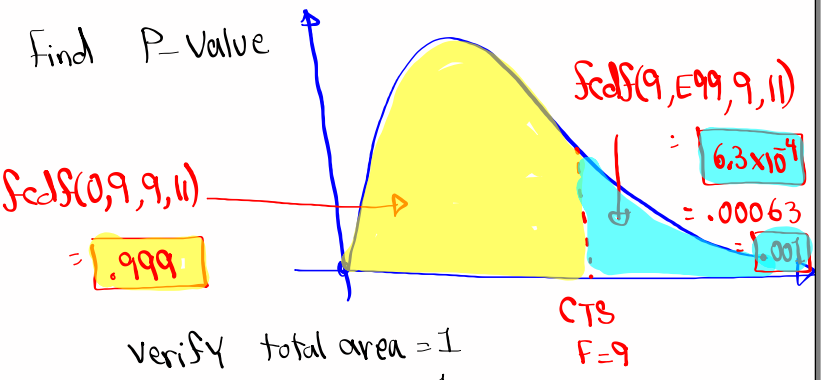
H_1 valid → Valid claim

FTR the claim

May 23-7:51 AM

CTS F=9 TTT Ndf=9 Ddf=11

Find P-Value



Verify total area = 1

.999 + .001 = 1

P-value = 2* Smaller area = .002

2* fcdf(9, E99, 9, 11) = .001

May 23-7:59 AM