Statistics

Fall 2022

Lecture 28

Feb 19-8:47 AM

I randomly selected exams from two groups. Here are the scores:

Females			Males		
72	85	90	88	96	100
100	80	75	65	75	80
	95				
$\bar{x}=85.3$			$\bar{x}=84$		
$s=10.4$			$s=13.2$		
$n=7$			$n=6$		

1) Find $\bar{x}$ & s for each group. Round to 1- decimal.

2) Clearly identify Sample 1 and Complete the chart below.

	Sample 1	Sample 2	
Males	$n_1=6$	$n_2=7$	Females
	$s_1=13.2$	$s_2=10.4$	

$s_1 > s_2$

3) Find
$Ndf = n_1 - 1 = 5$
$Ddf = n_2 - 1 = 6$

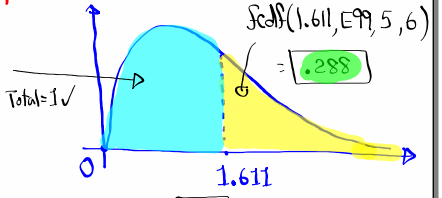
4) Find CTS F
$F = \frac{s_1^2}{s_2^2} = \frac{13.2^2}{10.4^2} = 1.611$ ✓

5) Find the p-value for TTT.

fcdf(0, 1.611, 5, 6) = .712

Total = 1 ✓

fcdf(1.611, E99, 5, 6) = .288



P-value = 2 * Smaller area = 2 * .288 = .576 ✓

Dec 13-6:00 AM

Test the claim that two pop. standard deviations are the same.

No α → use .05

$H_0: \sigma_1 = \sigma_2$ claim

$H_1: \sigma_1 \neq \sigma_2$ TTT

Sample 1	Sample 2
$n_1 = 6$	$n_2 = 7$
$S_1 = 13.2$	$S_2 = 10.4$

2-Samp F Test

CTS F = 1.611

P-value P = .575

P-value $>$ α

.575 .05

H_0 valid, H_1 invalid

↳ valid claim ⇒ FTR the claim

If we choose α to be .6, then

P-value $\leq \alpha$ ⇒ H_0 invalid, H_1 valid

.575 .6

↳ Invalid claim

Reject the claim

SG 31 ✓

Dec 13-6:14 AM

Comparing at least 3 pop. means SG 35

Method: ANOVA (Analysis of Variance)

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

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

K → # of groups ⇒ Ndf = K-1

n → Total Sample Size Ddf = n-K

CTS F ⇒ STAT TESTS ANOVA(L1, L2, L3, ...

P-value P

Proceed with testing chart.

Final Conclusion must be about the claim.

Reject the claim OR FTR the claim

Dec 13-6:45 AM

Students were randomly selected from 3 different colleges. Here are their ages:

ELAC			PCC			Mt. SAC		
18	32	40	19	34	38	24	31	38
20	25	28	23	27	42	18	29	44
35						27	35	
L1			L2			L3		

$K=3$

$n=7+6+8=21$

$Ndf=K-1=2$

$Ddf=n-K=18$

Use $\alpha=.02$ to test the claim that all pop. means are the same.

SG 35

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

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

CTS F = .188

P-value P = .831

ANOVA(L1, L2, L3 enter

P-value $>$ α

.831 .02

H_0 valid

H_1 invalid

Valid claim

FTR the claim

Dec 13-6:51 AM

Exam Scores were randomly selected from 4 different classes. Here are the Scores:

Morning			Afternoon			Evening			Online		
78	82	98	80	75	68	69	76	84	86	89	94
65	70	88	96	99		93	98	99	79	100	96
100									100	93	
L1			L2			L3			L4		

$K=4$

$n=7+5+6+8=26$

$Ndf=K-1=3$

$\Rightarrow$ $Ddf=n-K=22$

Use $\alpha=.1$ to test the claim that not all pop. means are the same.

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

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

CTS F = .961

P-value P = .429

ANOVA(L1, L2, L3, L4)

P-value Method only

P-value $>$ α

.429 .1

H_0 valid

H_1 invalid

Invalid claim

Reject the claim

If we choose α to be .5, then

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

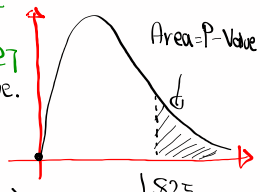
.429 .5

Dec 13-7:03 AM

Suppose we are comparing 5 pop. means with total Sample Size 32. CTS was 1.825. Find the Corresponding P-Value.

$K=5$ $n=32$ $Ndf=K-1=4$ $Ddf=n-K=27$

Always RT



P-value = fcdf(L, U, Ndf, Ddf)

= fcdf(1.825, E99, 4, 27) = .153

When P-value $> \alpha \Rightarrow H_0$ Valid $\Rightarrow$ All means are equal

$.153 > \alpha \Rightarrow$ choose $\alpha = .1, .09, .08, \ldots$

When P-value $\leq \alpha \Rightarrow H_1$ Valid $\Rightarrow$ At least one pop. mean is different

$.153 \leq \alpha \Rightarrow$ choose $\alpha = .16, .17, .2, \ldots$

SG 35 ✓✓✓

Dec 13-7:19 AM