Math 227
Spring 2021
Lecture 28

SG 36

Comparing at least 3 pop. means:

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

H_1: at least one population mean is different

RTT

CTS F
P-value P
$\Rightarrow$ STAT TESTS ANOVA(L1, L2, L3, ...

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

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

Given CTS F, RTT

Use $Fcdf(CTS, E99, NdF, DdF)$

$NdF = K-1$ K # of groups

$DdF = n-K$ n Total Sample Size

Morning		Afternoon		Night	
72	85	75	83	74	79
90	68	92	70	86	92
100		98	75	100	65
L1		L2		L3	

Use $\alpha = .1$ to test the claim that All pop. means are equal.

$K = 3$

$n = 5+6+6 = 17$

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

H_1: at least one mean is different. RTT

Morning → L1

Afternoon → L2

Night → L3

STAT

TESTS

ANOVA(L1, L2, L3

CTS F = .007

P-value P = .993

NdS = k-1 = 2

DdS = n-k = 14

P-value $> \alpha \Rightarrow$ H_0 valid $\Rightarrow$ Valid claim

H_1 invalid

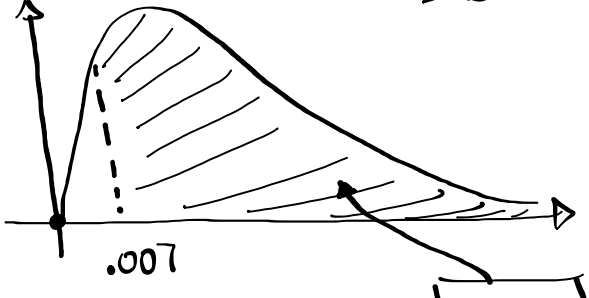
Support the claim

FTR the claim

ANOVA ⇒ Analysis of Variance.

Given CTS F = .007 RTT NdS = 2 DdS = 14

Find p-value.



fcdf(.007, E99, 2, 14) = .993

Students were randomly selected from 4 different schools. Here are their ages.

ELAC		Mt. SAC			Cal State LA			Cal Poly Pomona		
23	32	35	17	21	28	38	42	27	36	45
20	30	29	25	25	26	39	50	23	39	51
18	28	30			55			42		
L1		L2			L3			L4		

Use $\alpha = .01$ to test the claim that all pop. means are equal.

$K = 4$

$n = 6+7+7+7 = 27$

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

H_1: At least one mean is different. RTT

NdF = K-1 = 3
DdF = n-K = 23

Clear all lists

ELAC → L1

Mt. SAC → L2

Cal State LA → L3

Cal Poly Pomona → L4

STAT

TESTS

ANOVA(L1, L2, L3, L4) Enter

CTS F = 5.460

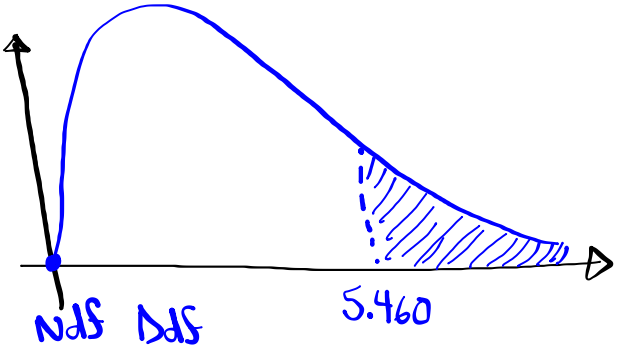
P-value P = .006

P-value $\leq \alpha \Rightarrow H_0$ invalid $\Rightarrow$ invalid claim $\Rightarrow$ Reject the claim

.006 .01 H_1 valid

Given CTS F = 5.460 RTT NdF = 3 DdF = 23

Find P-value



L U NdF DdF

fcdf(5.460, E99, 3, 23) = .006

Same exam was given to 5-Different Colleges.
Here are the results for randomly selected exams:

$K=5$
$n=5+5+4+5+5=24$

From each school.

ELAC		Mt. SAC		Chaffey		PCC		Glendale		
84	75	80	78	72	78	80	70	66	79	84
90	65	90	68	85	95	90	100	96	99	
100		98				85				
L5		L4		L3		L2		L1		

Test the claim that not all pop. means are equal.

No $\alpha \Rightarrow \alpha = .05$

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$

$NdF = K-1 = 4$, $DdF = n-K = 19$

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

CTS F = .048
P-value P = .995

P-value $> \alpha$

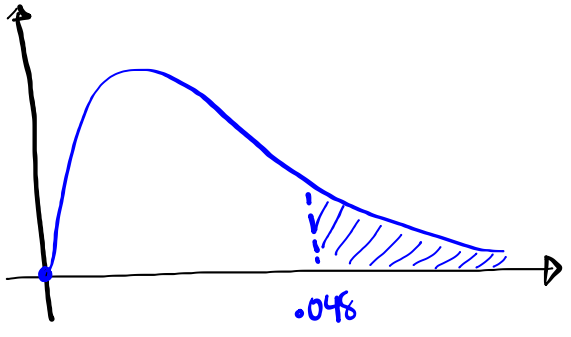
H_0 valid & H_1 invalid

Invalid claim
Reject the claim

STAT
TESTS
ANOVA(L1,L2,L3,L4,L5)

Given CTS F = .048
RTT
NdF = 4
DdF = 19

Find P-Value



fcdf(.048, E99, 4, 19) = .995

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

SG 36
ANOVA