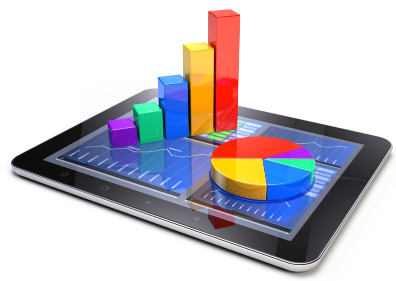
Math 110

Winter 2021

Lecture 20



Comparing two Population Standard deviations σ_1 & σ_2:

$H_0: \sigma_1 = \sigma_2$

$H_1: \sigma_1 \neq \sigma_2$ TTT

Sample 1	Sample 2
$S_1 =$	$S_2 =$
$n_1 =$	$n_2 =$

$S_1 > S_2$

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

P-Value Fcdf $Ndf = n_1 - 1$ $Ddf = n_2 - 1$

STAT TESTS 2-SampFTest

P-Value $> \alpha$ $\Leftrightarrow$ H_0 Valid & H_1 invalid

P-Value $\leq \alpha$ $\Leftrightarrow$ H_0 invalid & H_1 Valid

Reject the claim OR FTR the Claim

Consider the chart below:

Sample 1	Sample 2
$S_1 = 9$	$S_2 = 5$
$n_1 = 12$	$n_2 = 10$

① Verify $S_1 > S_2$ ✓

② Use $\alpha = .02$ to test the claim that $\sigma_1 = \sigma_2$.

$H_0: \sigma_1 = \sigma_2$ Claim

$H_1: \sigma_1 \neq \sigma_2$ TTT

CTS $F = 3.24$

P-value $P = .088$

STAT TESTS

2-SampFTest

P-value > α

.088 .02

H_0 Valid H_1 invalid

Valid claim ⇒ FTR the claim

Morning class: $n = 8$ $\bar{x} = 82$ $S = 10$

Afternoon Class: $n = 12$ $\bar{x} = 85$ $S = 14$

Use $\alpha = .1$ to test the claim that two pop. standard deviations are different.

$\sigma_1 \neq \sigma_2$

Afternoon	Morning
$S_1 = 14$	$S_2 = 10$
$n_1 = 12$	$n_2 = 8$

$H_0: \sigma_1 = \sigma_2$

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

CTS $F = 1.96$

P value $P = .382$

2-SampFTest

P-value > α

.382 .1

H_0 Valid & H_1 invalid

Invalid claim

Reject the claim

I Selected 8 female students, here are their ages:

18 25 32 40
21 29 30 35 ⇒ $\bar{x} = 29$, $S = 7$ Round to a whole #.

I selected 10 male students, here are their ages

24 34 44 19 28
40 30 50 18 35 ⇒ $\bar{x} = 32$, $S = 11$ Round to a whole #.

Test the claim that there is no difference between two Pop. Standard deviations. No α ⇒ .05

Males	Females
$S_1 = 11$	$S_2 = 7$
$n_1 = 10$	$n_2 = 8$

$S_1 > S_2$

$H_0: \sigma_1 = \sigma_2$ claim

$H_1: \sigma_1 \neq \sigma_2$ TTT

CTS F = 2.469

P-value P = .246

2-SampFTest

P-value > α
.246 > .05

H_0 Valid & H_1 invalid

Valid claim

⇒ Fail-to-Reject the claim.

SG 32

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

CTS F =

P value P =

STAT TESTS ↑

ANOVA(L1, L2, L3, ...

Enter

P-value > α ⇒ H_0 Valid & H_1 invalid

P-value ≤ α ⇒ H_1 Valid & H_0 invalid

Reject the claim OR FTR the claim

Mt. SAC			Chaffey			ELAC		
78	82	95	76	88	63	88	97	82
65	100	88		94	100	75	64	100
75	98	70				90	70	58
	55							
L1			L2			L3		

Use $\alpha = .1$ to test the claim that all pop. means are the same.

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

H_1: At least one mean is different.

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

CTS F = .122

P-Value P = .885

P-value > α

.885 .1

H_0 valid & H_1 invalid

Valid claim

⇒ FTR the claim

SG 36

Mt. SAC			Chaffey			Citrus		Cal Poly		
25	32	18	18	27	36	17	29	29	38	42
21	29	35	40	25	20	33	24	25	35	45
	19						30	55	60	20
L1			L2			L3		L4		

Test the claim that not all Pop. means are the same.

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

No α

⇒ .05

H_1: At least one mean is different claim

CTS F = 3.147

P-Value P = .044

ANOVA(L1, L2, L3, L4)

P-value $\leq \alpha$

.044 .05

H_0 invalid H_1 valid

Valid claim

FTR the claim

If we choose $\alpha = .02$

P-value > α

H_0 valid & H_1 invalid

Reject the claim

	H_0 Valid	H_0 invalid
Support H_0	✓	Type II
Reject H_0	Type I	✓

Final Exam

1) SG 1 – SG 28 + 2-Samp F Test
+ ANOVA

2) Review exam 1 & Exam 2

3) Starts at 4:45 Ends at 7:30

4) 9 Pages,