Statistics

Lecture 27

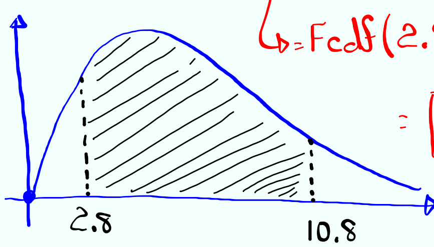
Feb 19-8:47 AM

Review on F - Dist. :

find $P(2.8 < F < 10.8)$ with $Ndf = 4$ & $Ddf = 30$.

$= Fcdf(2.8, 10.8, 4, 30)$

$= \boxed{.044}$

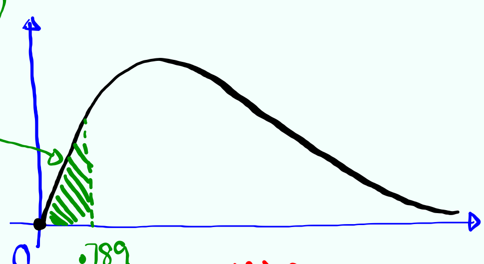


$Ndf > 2$

find $P(F < .789)$ with $Ndf = 3$ & $Ddf = 25$.

$Fcdf(0, .789, 3, 25)$

$= \boxed{.489}$



$Ndf > 2$

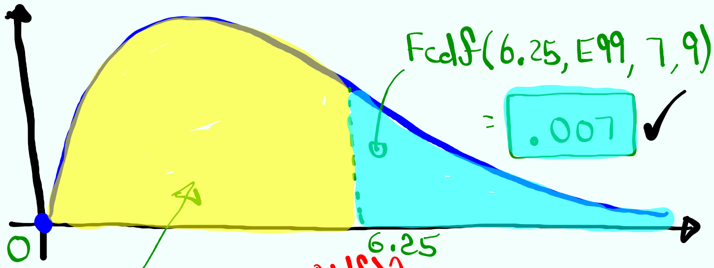
Dec 8-10:37 AM

Given $F = 6.25$ $Ndf = 7$ & $Ddf = 9$

1) Find the area to its right.

2) Find the area to its left.

3) Multiply the Smaller area by 2.



$Fcdf(6.25, E99, 7, 9) = \boxed{.007}$ ✓

$Ndf > 2$

$Fcdf(0, 6.25, 7, 9) = \boxed{.993}$ ✓

$2 \cdot$ Smaller area $= 2(.007) = \boxed{.014}$

Dec 8-10:43 AM

Comparing Two Population Standard deviations: S&29

$H_0: \sigma_1 = \sigma_2$	$H_0: \sigma_1 \leq \sigma_2$	$H_0: \sigma_1 \geq \sigma_2$
$H_1: \sigma_1 \neq \sigma_2$	$H_1: \sigma_1 > \sigma_2$	$H_1: \sigma_1 < \sigma_2$
TTT	RTT	LTT

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

1) $S_1 > S_2$

2) $Ndf = n_1 - 1$, $Ddf = n_2 - 1$

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

CTS F

P-Value P $\Rightarrow$ $\boxed{\text{STAT}}$ $\boxed{\text{TESTS}}$ $\boxed{\text{2-SampF Test}}$

inpt: $\boxed{\text{Stats}}$

Proceed with P-Value Method.

Dec 8-10:51 AM

Use the chart below to test the claim that $\boxed{\sigma_1 = \sigma_2}$.

No $\alpha \to .05$

Sample 1	Sample 2
$n_1 = 8$	$n_2 = 10$
$S_1 = 6$	$S_2 = 4$

$H_0: \sigma_1 = \sigma_2$ claim

$H_1: \sigma_1 \neq \sigma_2$ TTT

1) $S_1 > S_2$ ✓

2) $Ndf = n_1 - 1 = 7$

$Ddf = n_2 - 1 = 9$

3) CTS $F = \dfrac{S_1^2}{S_2^2} = \dfrac{6^2}{4^2} = \boxed{2.25}$

4) STAT → TESTS → 2-SampFTest → inpt: Stats

CTS $F = 2.25$

P-value $P = .256$ ✓

P-value Method

P-value > α

.256 > .05

H_0 valid, valid claim

H_1 invalid

FTR the claim

Dec 8-10:58 AM

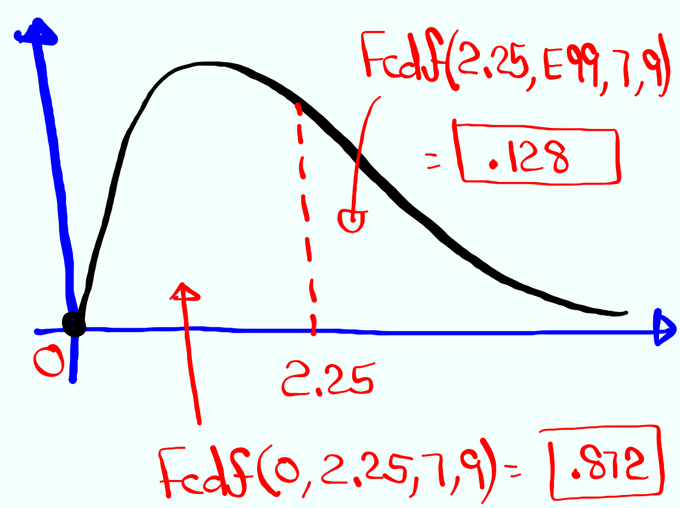
CTS $F = 2.25$

$Ndf = 7$

$Ddf = 9$

TTT

Find p-value.



P-value = 2 · Smaller area

$= 2(.128) = \boxed{.256}$

Dec 8-11:08 AM

Standard deviation of ages of 10 randomly Selected female students was 8 Yrs.
$n=10$ $s=8$

Standard deviation of ages of 12 randomly Selected male students was 5 Yrs.
$n=12$ $s=5$

use $\boxed{\alpha=.1}$ to test the claim that two pop. standard deviations are not equal.

$\sigma_1 \neq \sigma_2$ ← H_1

$H_0: \sigma_1 = \sigma_2$

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

Female	male
$n_1=10$	$n_2=12$
$s_1=8$	$s_2=5$

$s_1 > s_2$ ✓

$ndf = n_1 - 1 = 9$, $Ddf = n_2 - 1 = 11$

CTS $F = \frac{s_1^2}{s_2^2} = \frac{8^2}{5^2} = \boxed{2.56}$

CTS $F = 2.56$
P-value $P = .144$

2-Samp F Test

P-value > α
.144 > .1
H_0 valid
H_1 invalid → Invalid claim

Reject the claim

Dec 8-11:12 AM

Given

	Sample 1	Sample 2
	$n_1=8$	$n_2=8$
	$s_1=8$	$s_2=2$

Test the claim that $\boxed{\sigma_1 > \sigma_2}$.

No α → .05

H_1

$H_0: \sigma_1 \leq \sigma_2$

$s_1 > s_2$ ✓

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

$ndf = n_1 - 1 = 7$
$Ddf = n_2 - 1 = 7$

CTS $F = 16$
P-value $P = 8.181 \times 10^{-4}$

CTS $F = \frac{s_1^2}{s_2^2} = \frac{8^2}{2^2} = \boxed{16}$

2-SampF Test

P-value $\leq \alpha$
H_0 invalid
H_1 valid → valid claim

FTR the claim

Dec 8-11:24 AM

Comparing At least 3 population Means. SG 33

Method: ANOVA (Analysis of Variance)

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

H_1: At least one mean is different. RTT

Ndf = K − 1 K ⇒ # of groups

Ddf = n − K n ⇒ Total Sample Size

CTS F

P-Value P ⇒ $\boxed{\text{STAT}}$ $\boxed{\text{TESTS}}$ $\boxed{\text{ANOVA}}$

First Save all data elements in L1, L2, L3, ...

Proceed with P-Value Method.

Dec 8-11:33 AM

Ages of randomly Selected Students are given below:

ELAC	Mt. SAC	Chaffey
25, 28, 19, 20, 30, 18	23, 27, 32, 18, 25, 30	21, 28, 33, 19, 25

Test the claim that all means are equal.

No α → .05

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

H_1: At least one mean is different. RTT

ELAC → L1

Mt. SAC → L2

Chaffey → L3

K = 3 → Ndf = K − 1 = 2

n = 17 → Ddf = n − K = 14

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

CTS F = .371

P-Value P = .697

P-Value > α

H_0 valid H_1 invalid

Valid claim

FTR the claim

Dec 8-11:39 AM

Exam Scores from 4 of my classes are given below

L1 In-Person	L2 Monday only	L3 Tuesday only	L4 Online
75 83 95 70 80	68 98 88 58 78	75 85 98 100 80	92 96 100 90 88 98

$K=4$ $Ndf = K-1 = 3$

$n=21$ $Ddf = n-K = 17$

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

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

H_1: At least one mean is different. RTT

$\boxed{\begin{array}{l} \text{CTS } F = 2.484 \\ \text{P-Value } P = .096 \end{array}}$

ANOVA(L1, L2, L3, L4)

P-Value $>$ α
.096 .01

H_0 valid

H_1 invalid

→ Valid claim

FTR the claim

If $\alpha = .1$, then

P-Value $\leq \alpha$
.096 .1

H_0 invalid → Invalid claim → Reject the claim

H_1 valid

Dec 8-11:51 AM

Gas Prices were randomly selected from different gas stations in 3 major Cities in Ca.

L1 Los Angeles	L2 San Francisco	L3 San Diego
4.25 4.85 4.75 4.05 4.95	4.85 5.25 5.15 5.85 6.15	4.29 4.39 4.49 3.99 3.89

Test the claim that not all means are equal.

no α → .05

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

H_1: At least one mean is diffent claim, RTT

$K=3$ $Ndf = K-1 = 2$

$n=15$ $Ddf = n-K = 12$

$\boxed{\begin{array}{l} \text{CTS } F = 11.992 \\ \text{P-Value } P = .001 \end{array}}$

ANOVA(L1, L2, L3)

P-Value $\leq \alpha$

H_0 invalid

H_1 Valid → Valid claim → FTR the claim.

SG 29 & 33 ✓

Dec 8-12:06 PM