Hypothesis Testing

Acme
2007-Mar-05 : 20:40:36

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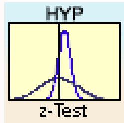
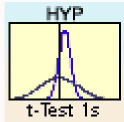
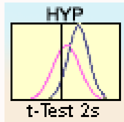
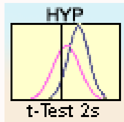
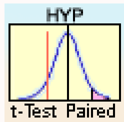
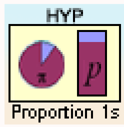
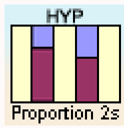
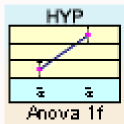
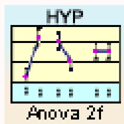
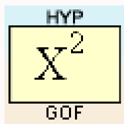
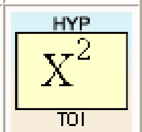
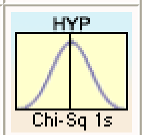
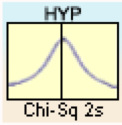
Project Introduction

Project Details	
Project Name	HYP
Description	Hypothesis Testing
Objective	
Abstract	
Project Leader	
Commencement Date	15-Jul-2006
Project Completion Date	15-Jul-2006
Completion Date	
Status	Not Completed

Project Flow

Stages	Objective	Activities	Deliverables	Applet
1	Z-Test	Compare sample mean against infinite population mean	Sample mean < test; sample mean = test or sample > test	
2	T-Test	Compare sample mean against finite population mean	Sample mean < test; sample mean = test or sample > test	
3	T-Test 2 Sample	Compare two sample means with EQUAL variances	Sample mean < test; sample mean = test or sample > test	
		Compare two sample means with UNEQUAL variances	Sample mean < test; sample mean = test or sample > test	
4	T-Test Paired	Compare sample means of two paired samples	Sample mean < test; sample mean = test or sample > test	
5	One Sample Proportion	Compare sample proportion against infinite population proportion	Sample mean < test; sample mean = test or sample > test	
6	Two Sample Proportion	Compare sample proportion against another sample proportion	Sample mean < test; sample mean = test or sample > test	
7	One-Way Anova	Compare sample means against finite population mean	Sample means are different (or not)	
8	Two-Way Anova	Compare two groups of sample means against finite population mean	Groups are different (or not)	
9	Goodness-of-Fit	Compare how well a data fits the expected data	Significant fit (or not)	
10	Test-of-Independence	Compare two samples to see if they are independent	Independtent (or not, i.e. related)	
11	One Sample Variance	Chi-square test for difference in one sample variance		
12		F-test for differences in two		

	Two Sample Variance	sample variances		

Hypothesis Testing

Z-Test Sample

Bawani Thambu
Acme
2007-Mar-05 : 18:58:59

Applet Introduction

Applet Details	
Applet Title	Z-Test
Description	Z-Test Sample
Objective	Example for Z-Test
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	Zteam
Team Members	**1** IR00109 Shamel Razak

z - Test Data

Mode of selection : Sample Data

Summary Data

	Population	Sample
Size	{Infinity}	20
Mean	25.00	25.65
Variance	(Estimated)	3.61
Alpha	0.05	

Data

No.	Population	Sample
1		27.00
2		25.00
3		24.00
4		23.00
5		25.00
6		24.00
7		27.00
8		29.00
9		24.00
10		26.00
11		28.00
12		26.00
13		28.00
14		24.00
15		23.00
16		25.00
17		27.00
18		27.00
19		28.00
20		23.00

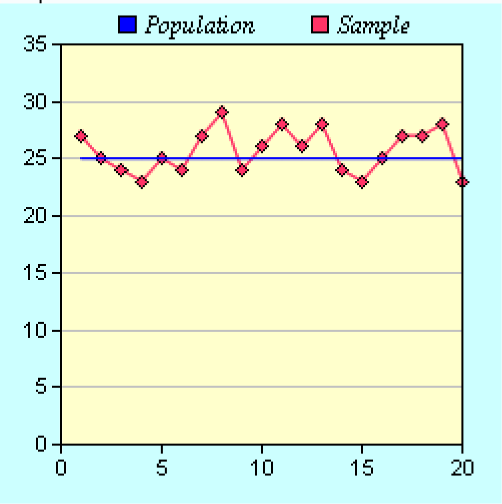
z - Test

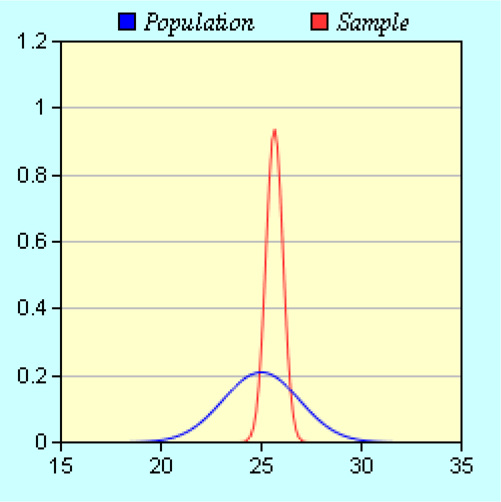
Summary Data

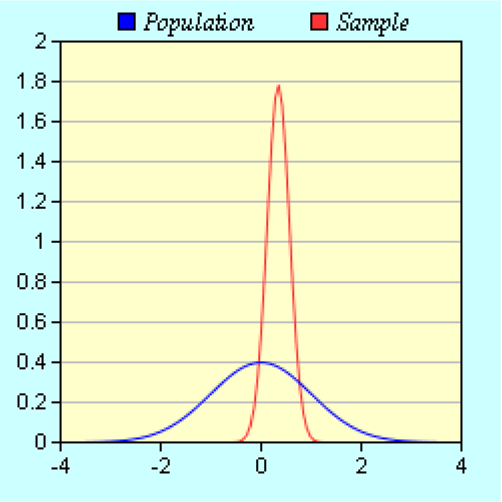
	Population	Sample
Size	(Infinity)	20
Mean	25.00	25.65
Variance	3.61	3.61
Alpha	0.05	

Normal Distribution

Assumption
Population is normally distributed
Population has known mean







Hypothesis

Left Tail	Both Tails	Right Tail
Ho : μ >= 25.00 [Claim]	**Ho : μ =** 25.00 [Claim]	**Ho : μ <=** 25.00 [Claim]
Ha : μ < 25.00 [Alternative]	**Ha : μ ≠** 25.00 [Alternative]	**Ha : μ >** 25.00 [Alternative]

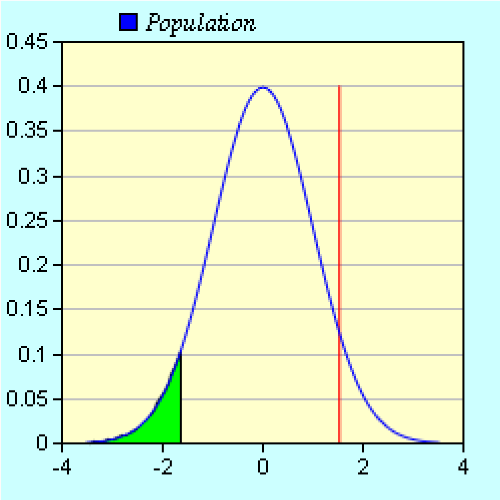
Distribution of Test Statistic

If Ho is true;
U_{α} is normally distributed

Decision Rule

Left Tail

Alpha	= 0.05
U_{α}	= 1.65
Accept Ho if	$-U_{\alpha} < U_{sample}$
Reject Ho	otherwise



Calculate Test Statistic

$$U_{Sample} = \frac{(\bar{x} - \mu)}{\sqrt{\frac{\sigma^2}{n}}} = \quad 1.53$$

Ho	Accept

Test Statistic is not significant at 0.05

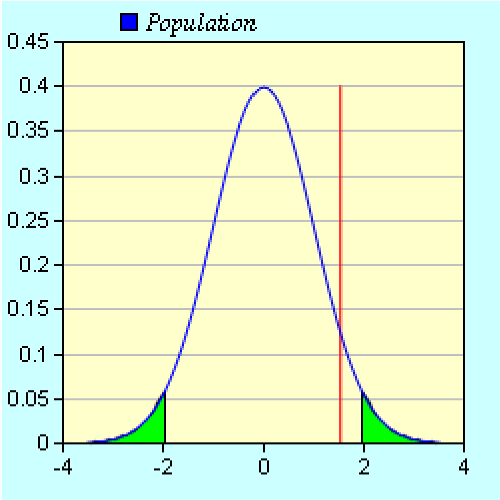
Conclusion

Not enough statistical evidence that the true mean is < than 25.00 .

If Ho is true;
$U_{\alpha/2}$ is normally distributed

Both Tails

Alpha	= 0.05
$U_{\alpha/2}$	= 1.96
Accept Ho if	$-U_{\alpha/2} < U_{sample} < U_{\alpha/2}$
Reject Ho	otherwise



$$U_{Sample} = \frac{(\bar{x} - \mu)}{\sqrt{\frac{\sigma^2}{n}}} = \quad 1.53$$

Ho	Accept

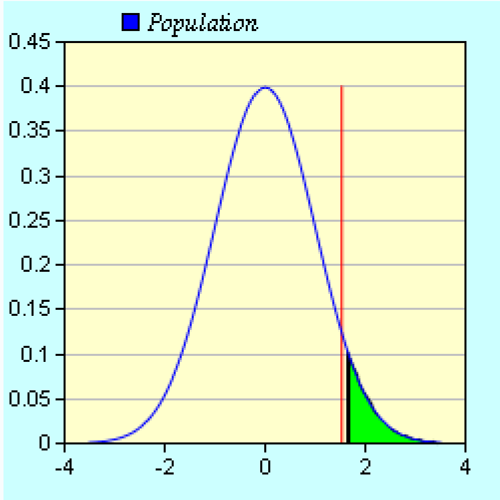
Test Statistic is not significant at 0.05

Not enough statistical evidence that the true mean is not 25.00 .

If Ho is true;
U_{α} is normally distributed

Right Tail

Alpha	= 0.05
U_{α}	= 1.65
Accept Ho if	$U_{sample} < U_{\alpha}$
Reject Ho	otherwise



$$U_{Sample} = \frac{(\bar{x} - \mu)}{\sqrt{\frac{\sigma^2}{n}}} = \quad 1.53$$

Ho	Accept

Test Statistic is not significant at 0.05

Not enough statistical evidence that the true mean is > than 25.00 .

Hypothesis Testing

t-Test 1s

Bawani Thambu
Acme
2007-Mar-05 : 19:00:06

Applet Introduction

Applet Details	
Applet Title	t-Test 1s
Description	t-Test 1s
Objective	One Sample t-Test
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	1sTeam
Team Members	**1** IR00105 Saleh Drus **2** IR0002 Ang Koon Long

t - Test : 1 - Sample Data

Mode of selection : Sample Values [Mean, Variance]

Summary Data

	Sample1	Sample2
Size	{Infinity}	20
Mean	24.000	24.650
Variance	(Estimated)	3.608
Alpha	0.05	

t - Test : 1 - Sample

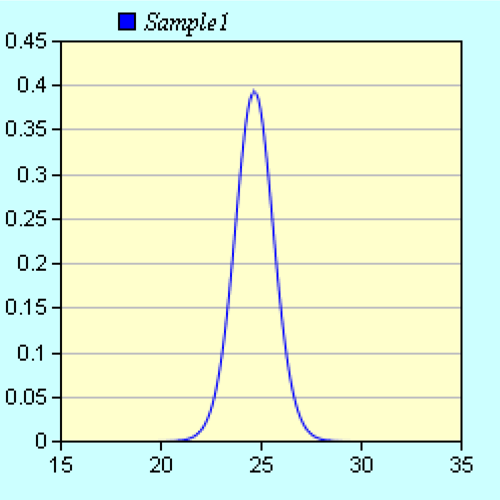
Summary Data

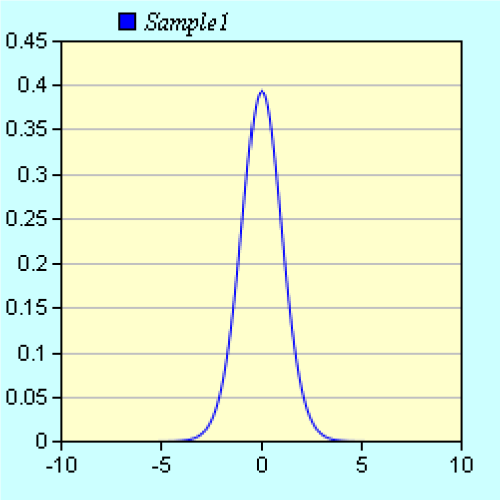
	Sample1	Sample2
Size	(Infinity)	20
Mean	24.00	24.65
Variance	0.00	3.61
Alpha	0.05	

Normal Distribution

Assumption

Population is normally distributed
Population has known mean





Hypothesis

Left Tail	Both Tails	Right Tail
Ho : μ >= 24.00 [Claim]	**Ho : μ =** 24.00 [Claim]	**Ho : μ <=** 24.00 [Claim]
Ha : μ < 24.00 [Alternative]	**Ha : μ ≠** 24.00 [Alternative]	**Ha : μ >** 24.00 [Alternative]

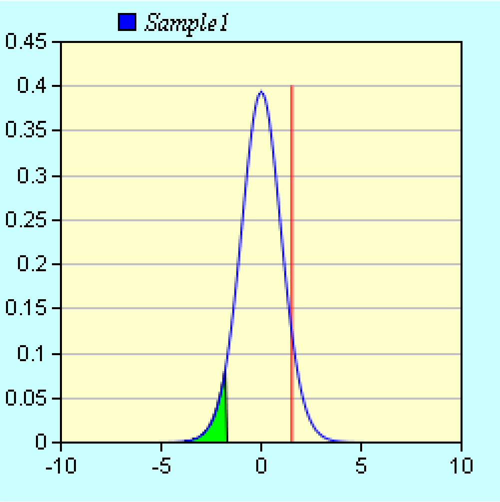
Distribution of Test Statistic

If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Decision Rule

Left Tail

Alpha	= 0.05
$\mathbf{t_{a, v}}$	= 1.73
Accept Ho if	$-t_{\alpha, v} < t_{sample}$
Reject Ho	otherwise



Calculate Test Statistic

$$t_{Sample} = \frac{(\bar{x} - \mu)}{\sqrt{\frac{s^2}{n}}} = 1.53$$

Ho Accept

Test Statistic is not significant at 0.05

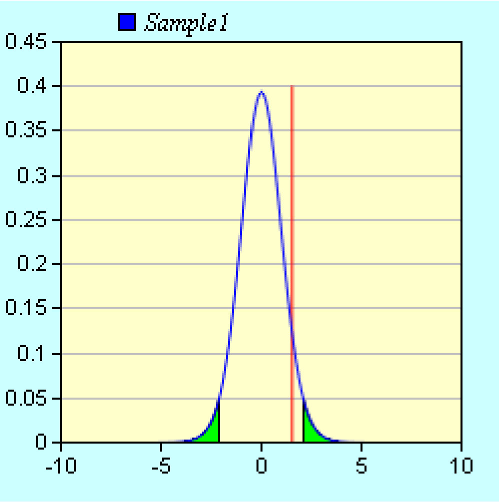
Conclusion

Not enough statistical evidence that the true mean is < than 24.00 .

If Ho is true;
$t_{a/2, v}$ is t-distributed with v degrees of freedom

Both Tails

Alpha	= 0.05
$\mathbf{t_{a/2, v}}$	= 2.09
Accept Ho if	$-t_{\alpha/2, v} < t_{sample} < t_{\alpha/2, v}$
Reject Ho	otherwise



$$t_{Sample} = \frac{(\bar{x} - \mu)}{\sqrt{\frac{s^2}{n}}} = 1.53$$

Ho Accept

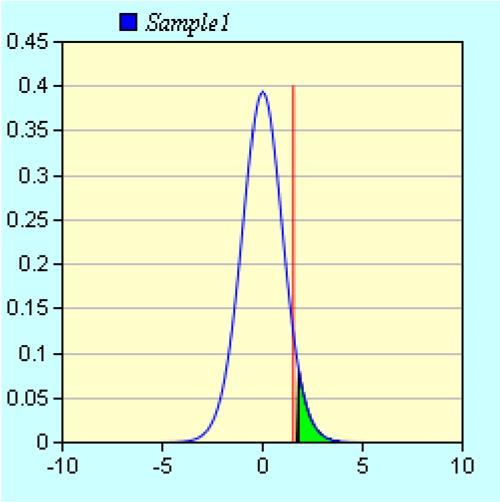
Test Statistic is not significant at 0.05

Not enough statistical evidence that the true mean is not 24.00 .

If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Right Tail

Alpha	= 0.05
$\mathbf{t_{a, v}}$	= 1.73
Accept Ho if	$t_{sample} < t_{\alpha, v}$
Reject Ho	otherwise



$$t_{Sample} = \frac{(\bar{x} - \mu)}{\sqrt{\frac{s^2}{n}}} = 1.53$$

Ho Accept

Test Statistic is not significant at 0.05

Not enough statistical evidence that the true mean is > than 24.00 .

Hypothesis Testing

t-Test 2s -Eq

Bawani Thambu
Acme
2007-Mar-05 : 19:08:33

Applet Introduction

Applet Details	
Applet Title	t-Test 2s
Description	t-Test 2s -Eq
Objective	Example for t-Test2s Equal variance
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	2sTteam
Team Members	

1	IR00107	Salman Shaari
2	IR00115	Shree Shakthivel

t - Test : 2 - Sample Data

Mode of selection : Sample Data

Summary Data

	Sample1	Sample2
Size	20	20
Mean	5.51	5.66
Variance	0.01	0.02
Alpha	0.05	

Sample 1 Data

No.	Sample1
1	5.50
2	5.40
3	5.60
4	5.50
5	5.40
6	5.50
7	5.50
8	5.60
9	5.40
10	5.50
11	5.70
12	5.60
13	5.50
14	5.60
15	5.40
16	5.50
17	5.60
18	5.40
19	5.60
20	5.40

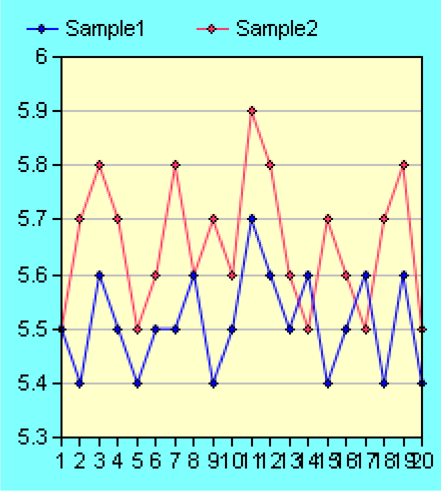
Sample 2 Data

No.	Sample2
1	5.50
2	5.70
3	5.80
4	5.70
5	5.50
6	5.60
7	5.80
8	5.60
9	5.70
10	5.60
11	5.90
12	5.80
13	5.60
14	5.50
15	5.70
16	5.60
17	5.50
18	5.70
19	5.80
20	5.50

t Test : 2 Sample (Variance)

Assumption

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.



Hypothesis

Left Tail
Ho : µ = 0.01 [Alternative]
Ha : µ < 0.01 [Claim]

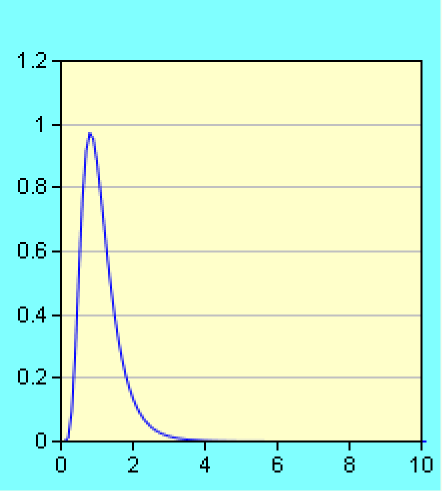
Distribution of Test Statistic

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a,v1,v2}$ is F-distributed with v degrees of freedom

Decision Rule

Alpha = 0.95
$F_{1-a,n1,n2}$ = 0.45

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.

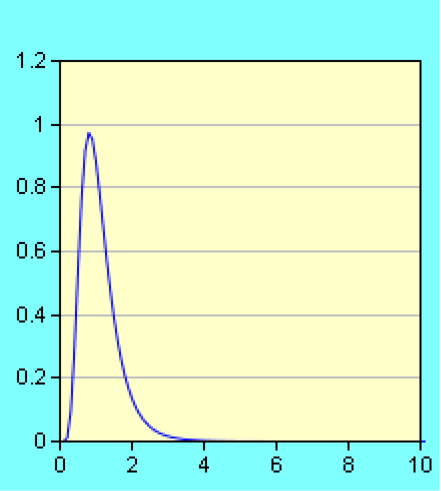


Both Tails
Ho : µ = 0.01 [Claim]
Ha : µ ? 0.01 [Alternative]

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a/2,v1,v2}$ is F-distributed with v degrees of freedom

Alpha = 0.975 0.025
$F_{1-a,n1,n2}$ = 0.39 2.55
Accept Ho if $F_{1-\alpha/2,v1,v2} < F_{sample} < F_{\alpha/2,v1,v2}$

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.

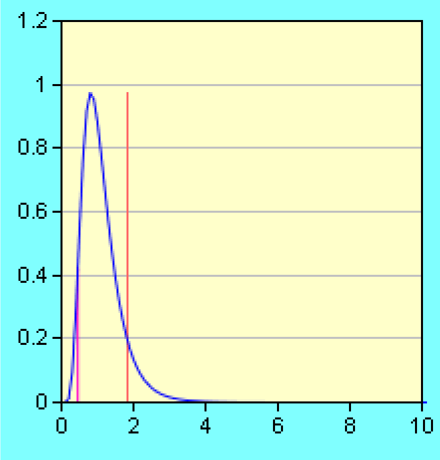


Right Tail
Ho : µ = 0.01 [Alternative]
Ha : µ > 0.01 [Claim]

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a,v1,v2}$ is F-distributed with v degrees of freedom

Alpha = 0.05
$F_{a,n1,n2}$ = 2.18
Accept Ho if $F_{sample} < F_{\alpha,v1,v2}$

Accept Ho if $F_{1-\alpha,v1,v2} < F^2_{sample}$
Reject Ho otherwise



Calculate Test Statistic

$$F_{Sample} = \frac{s_1^2}{s_2^2} = 1.83$$

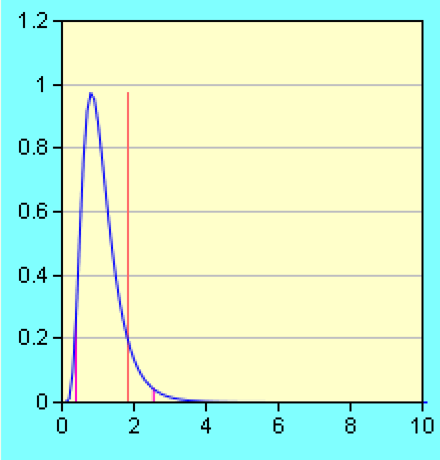
Statistical Decision

Ho Accept
Test Statistic is not significant at 0.05%

Conclusion

Not enough statistical evidence that the true variance is < than 0.01.

Reject Ho otherwise

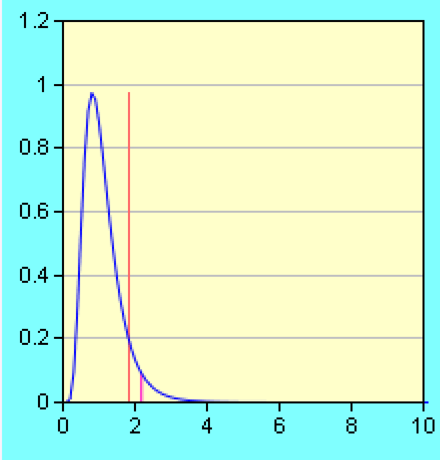


$$F_{Sample} = \frac{s_1^2}{s_2^2} = 1.83$$

Ho Accept
Test Statistic is not significant at 0.05%

Not enough statistical evidence that the true variance is not 0.01.

Reject Ho otherwise



$$F_{Sample} = \frac{s_1^2}{s_2^2} = 1.83$$

Ho Accept
Test Statistic is not significant at 0.05%

Not enough statistical evidence that the true variance is not 0.01.

t - Test : 2 - Sample

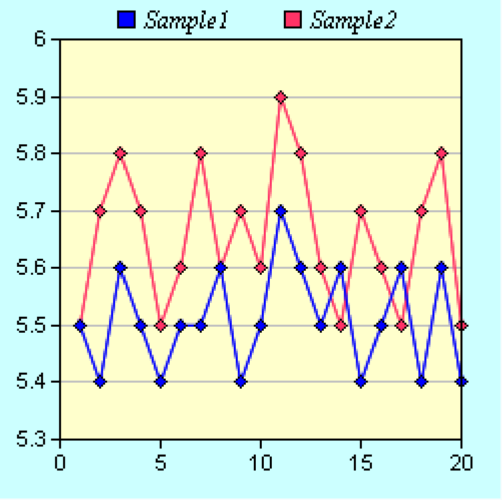
Summary Data (Equal Variance)

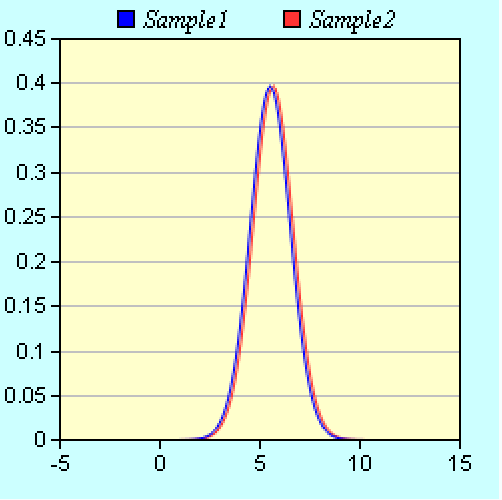
	Sample1	Sample2
Size	20	20
Mean	5.51	5.66
Variance	0.01	0.02
Alpha	0.05	

Alpha	0.05
v1	19
v2	19
F val	2.18
F-Ratio	1.83

Normal Distribution

Assumption
Population is normally distributed
Population has known mean





Hypothesis

Left Tail	Both Tails	Right Tail
Ho : μ >= 5.51 [Claim]	**Ho : μ =** 5.51 [Claim]	**Ho : μ <=** 5.51 [Claim]
Ha : μ < 5.51 [Alternative]	**Ha : μ ≠** 5.51 [Alternative]	**Ha : μ >** 5.51 [Alternative]

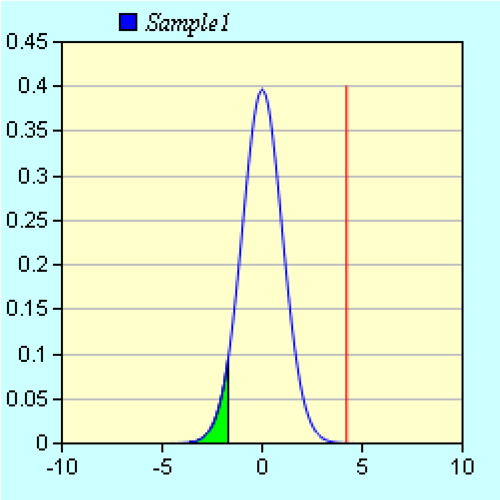
Distribution of Test Statistic

If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Decision Rule

Left Tail

Alpha	= 0.05
$t_{a, v}$	= 1.69
Accept Ho if	$-t_{\alpha, (n1+n2-2)} < t_{sample}$
Reject Ho	otherwise



Calculate Test Statistic

$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{s^2_{\bar{x}_2 - \bar{x}_1}}} = 4.23$$

$$s_{\bar{x}_2 - \bar{x}_1} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \sqrt{\frac{n_1 + n_2}{n_1 \times n_2}}$$

Ho Accept

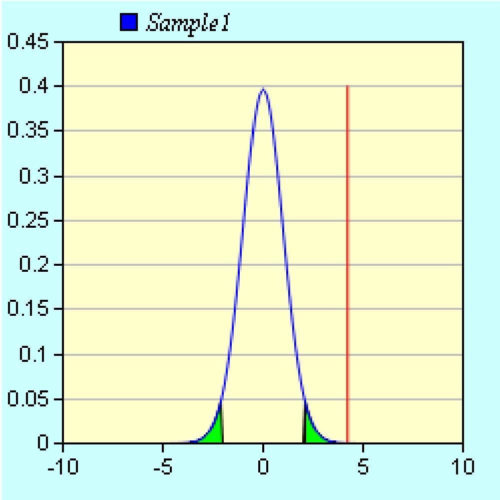
Test Statistic is not significant at 0.05

Conclusion

If Ho is true;
$t_{a/2, v}$ is t-distributed with v degrees of freedom

Both Tails

Alpha	= 0.05
$t_{a/2, v}$	= 2.02
Accept Ho if	$-t_{\alpha/2, v} < t_{sample} < t_{\alpha/2, v}$
Reject Ho	otherwise



$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{s^2_{\bar{x}_2 - \bar{x}_1}}} = 4.23$$

$$s_{\bar{x}_2 - \bar{x}_1} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \sqrt{\frac{n_1 + n_2}{n_1 \times n_2}}$$

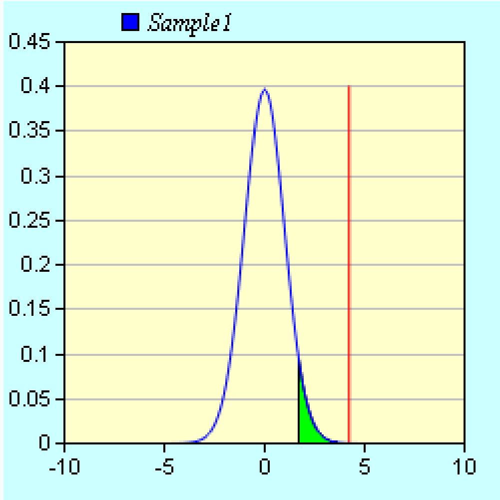
Ho Reject

Test Statistic is significant at 0.05

If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Right Tail

Alpha	= 0.05
$t_{a, v}$	= 1.69
Accept Ho if	$t_{sample} < t_{\alpha, (n1+n2-2)}$
Reject Ho	otherwise



$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{s^2_{\bar{x}_2 - \bar{x}_1}}} = 4.23$$

$$s_{\bar{x}_2 - \bar{x}_1} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \sqrt{\frac{n_1 + n_2}{n_1 \times n_2}}$$

Ho Reject

Test Statistic is significant at 0.05

Not enough statistical evidence that the true mean is < than 5.51 .	Enough statistical evidence that the true mean is not 5.51 .	Enough statistical evidence that the true mean is > than 5.51 .

Hypothesis Testing

t-Test 2s (Uneq)

Bawani Thambu
Acme
2007-Mar-05 : 19:22:24

Applet Introduction

Applet Details	
Applet Title	t-Test 2s
Description	t-Test 2s (Uneq)
Objective	t-Test 2 Sample Un Equal Variance
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	2sUTeam
Team Members	

1	IR00106	Sally Sally
2	IR0007	Azura Fariq

t - Test : 2 - Sample Data

Mode of selection : Sample Values [Mean, Variance]

Summary Data

	Sample1	Sample2
Size	20	20
Mean	5.495	5.655
Variance	0.080	0.015
Alpha	0.05	

t Test : 2 Sample (Variance)

Assumption

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.

Hypothesis

Left Tail
Ho : µ = 0.02 [Alternative]
Ha : µ < 0.02 [Claim]

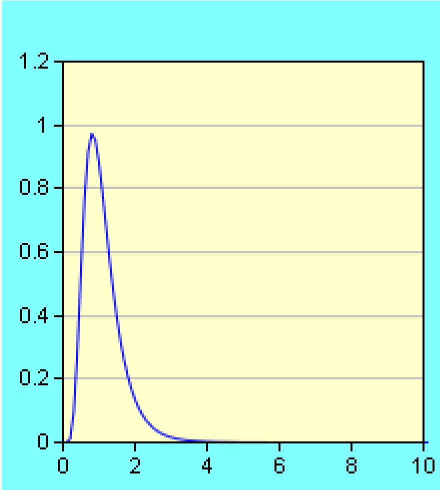
Distribution of Test Statistic

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a,v1,v2}$ is F-distributed with v degrees of freedom

Decision Rule

Alpha = 0.95
$F_{1-a,n1,n2}$ = 0.45

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.

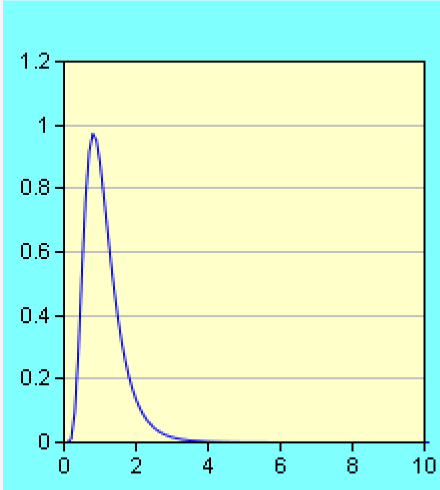


Both Tails
Ho : µ = 0.02 [Claim]
Ha : µ ? 0.02 [Alternative]

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a/2,v1,v2}$ is F-distributed with v degrees of freedom

Alpha = 0.975 0.025
$F_{1-a,n1,n2}$ = 0.39 2.55
Accept Ho if $F_{1-\alpha/2,v1,v2} < F_{sample} < F_{\alpha/2,v1,v2}$

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.

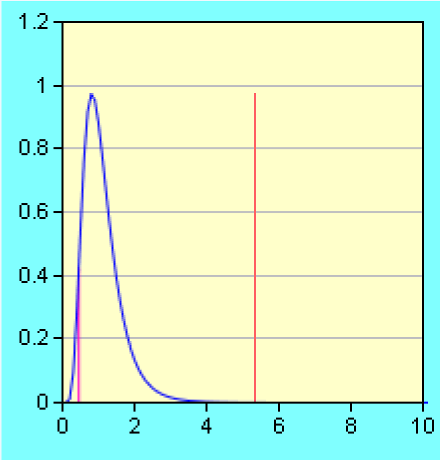


Right Tail
Ho : µ = 0.02 [Alternative]
Ha : µ > 0.02 [Claim]

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a,v1,v2}$ is F-distributed with v degrees of freedom

Alpha = 0.05
$F_{a,n1,n2}$ = 2.18
Accept Ho if $F_{sample} < F_{\alpha,v1,v2}$

Accept Ho if $F_{1-\alpha,v1,v2} < F^2_{sample}$
Reject Ho otherwise



Calculate Test Statistic

$$F_{Sample} = \frac{s_1^2}{s_2^2} = 5.33$$

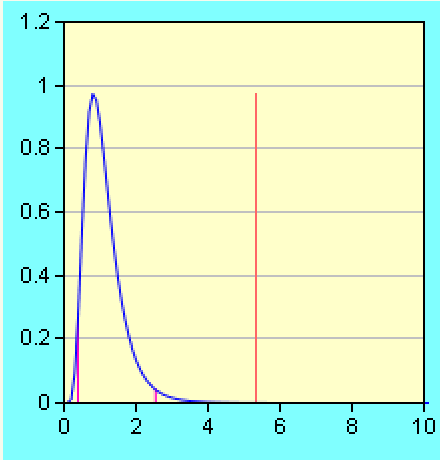
Statistical Decision

Ho Accept
Test Statistic is not significant at 0.05%

Conclusion

Not enough statistical evidence that the true variance is < than 0.02.

Reject Ho otherwise

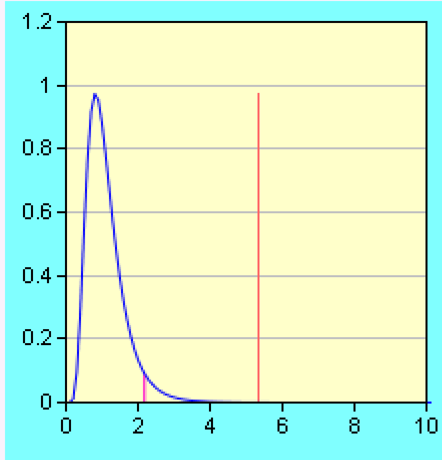


$$F_{Sample} = \frac{s_1^2}{s_2^2} = 5.33$$

Ho Reject
Test Statistic is significant at 0.05%

Enough statistical evidence that the true variance is not 0.02.

Reject Ho otherwise



$$F_{Sample} = \frac{s_1^2}{s_2^2} = 5.33$$

Ho Reject
Test Statistic is significant at 0.05%

Enough statistical evidence that the true variance is not 0.02.

t - Test : 2 - Sample

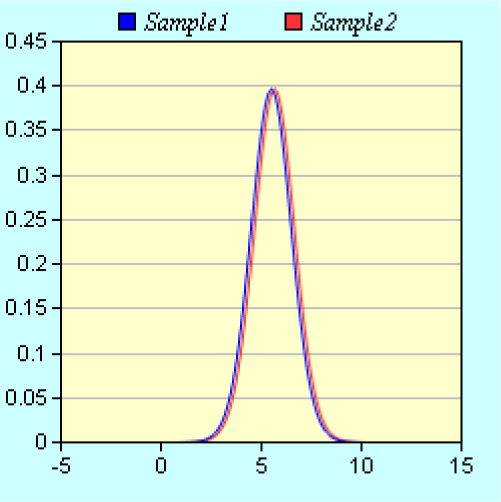
Summary Data (Unequal Variance)

	Sample1	Sample2
Size	20	20
Mean	5.50	5.66
Variance	0.08	0.02
Alpha	0.05	

Alpha	0.05
v1	19
v2	19
F val	2.18
F-Ratio	5.33

Normal Distribution

Assumption
Population is normally distributed
Population has known mean



Hypothesis

Left Tail	Both Tails	Right Tail
Ho : μ >= 5.50 [Claim]	**Ho : μ =** 5.50 [Claim]	**Ho : μ <=** 5.50 [Claim]
Ha : μ < 5.50 [Alternative]	**Ha : μ ≠** 5.50 [Alternative]	**Ha : μ >** 5.50 [Alternative]

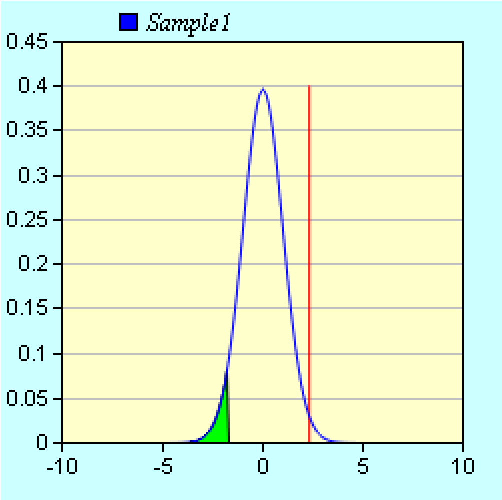
Distribution of Test Statistic

If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Decision Rule

Left Tail

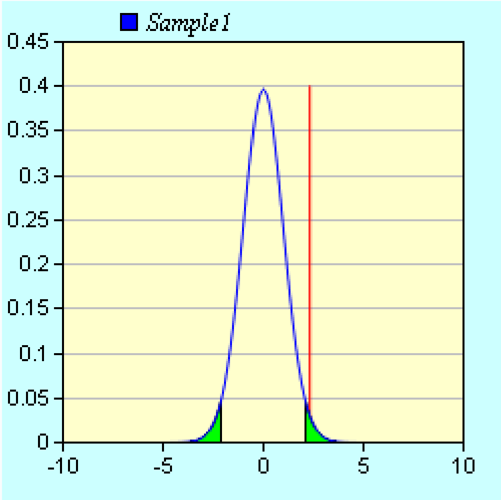
Alpha	= 0.05
$t_{a, v}$	= 1.71
Accept Ho if	$-t_{\alpha, (n1+n2-2)} < t_{sample}$
Reject Ho	otherwise



If Ho is true;
$t_{a/2, v}$ is t-distributed with v degrees of freedom

Both Tails

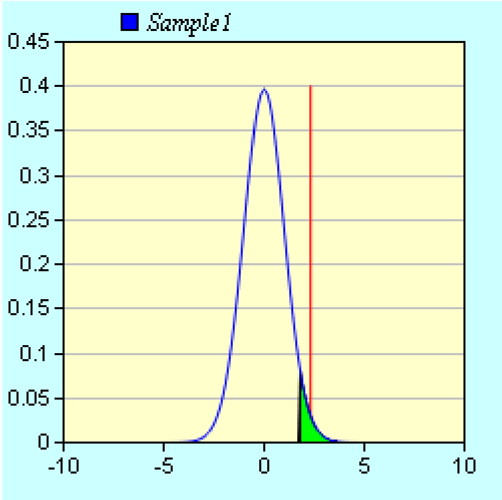
Alpha	= 0.05
$t_{a/2, v}$	= 2.06
Accept Ho if	$-t_{\alpha/2, v} < t_{sample} < t_{\alpha/2, v}$
Reject Ho	otherwise



If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Right Tail

Alpha	= 0.05
$t_{a, v}$	= 1.71
Accept Ho if	$t_{sample} < t_{\alpha, (n1+n2-2)}$
Reject Ho	otherwise



Calculate Test Statistic

$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \quad 2.32$$

$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \quad 2.32$$

$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \quad 2.32$$

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\left(\left(\frac{s_1^2}{n_1}\right)^2 \frac{1}{n_1+1} + \left(\frac{s_2^2}{n_2}\right)^2 \frac{1}{n_2+1}\right)} - 2$$

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\left(\left(\frac{s_1^2}{n_1}\right)^2 \frac{1}{n_1+1} + \left(\frac{s_2^2}{n_2}\right)^2 \frac{1}{n_2+1}\right)} - 2$$

Ho Accept

Test Statistic is not significant at 0.05

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\left(\left(\frac{s_1^2}{n_1}\right)^2 \frac{1}{n_1+1} + \left(\frac{s_2^2}{n_2}\right)^2 \frac{1}{n_2+1}\right)} - 2$$

Ho Reject

Test Statistic is significant at 0.05

Ho Reject

Test Statistic is significant at 0.05

Conclusion

Not enough statistical evidence that the true mean is < than 5.50 .

Enough statistical evidence that the true mean is not 5.50 .

Enough statistical evidence that the true mean is > than 5.50 .

Hypothesis Testing

Paired T-Test for Paired Samples

Bawani Thambu
Acme
2007-Mar-05 : 19:33:11

Applet Introduction

Applet Details	
Applet Title	Paired T-Test
Description	Paired T-Test for Paired Samples
Objective	To provide a method for Paired T-Test
Abstract	A Paired T-Test is used when the samples have a before-after relaltionship.
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	Paired T-Test
Team Members	**1** IR0009 Bawani Ho **2** IR00116 Sindy Chong

t - Test : Paired Data

Mode of selection : Sample Data

Summary Data

	Sample1	Sample2	Difference
Size	20	20	40
Mean	5.51	5.52	5.51
Variance	0.01	0.02	0.01
Alpha	0.05		

Data

No.	Sample1	Sample2	Difference
1	5.50	5.50	0.00
2	5.40	5.30	-0.10
3	5.60	5.70	0.10
4	5.50	5.60	0.10
5	5.40	5.30	-0.10
6	5.50	5.40	-0.10
7	5.50	5.50	0.00
8	5.60	5.60	0.00
9	5.40	5.50	0.10
10	5.50	5.60	0.10
11	5.70	5.60	-0.10
12	5.60	5.70	0.10
13	5.50	5.60	0.10
14	5.60	5.50	-0.10
15	5.40	5.30	-0.10
16	5.50	5.60	0.10
17	5.60	5.50	-0.10
18	5.40	5.40	0.00
19	5.60	5.60	0.00
20	5.40	5.50	0.10

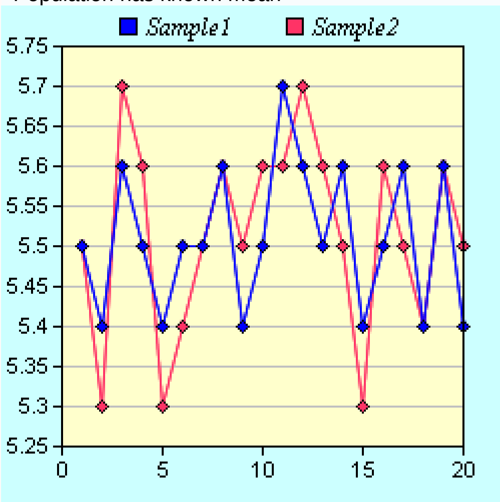
t - Test : Paired

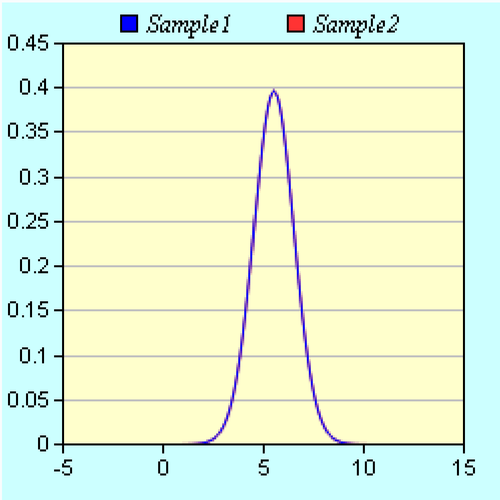
Summary Data

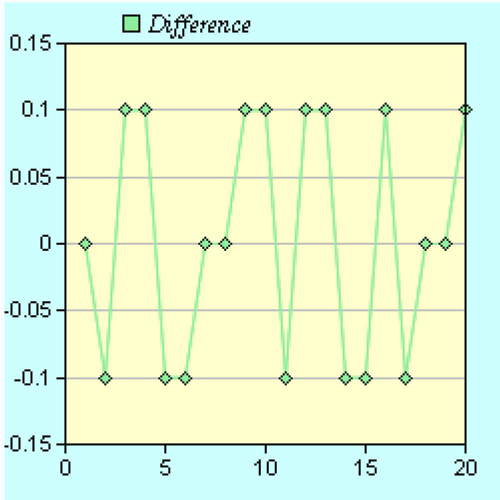
	Sample1	Sample2	Difference
Size	20	20	40.00
Mean	5.51	5.52	5.51
Variance	0.01	0.02	0.01
Alpha	0.05		

Normal Distribution

Assumption
Population is normally distributed
Population has known mean







Hypothesis

Left Tail	Both Tails	Right Tail
Ho : μ1 - μ2 >= 5.51 [Claim]	**Ho : μ1 - μ2 =** 5.51 [Claim]	**Ho : μ1 - μ2 <=** 5.51 [Claim]
Ha : μ1 - μ x < 5.51 [Alternative]	**Ha : μ1 - μ x ≠** 5.51 [Alternative]	**Ha : μ1 - μ x >** 5.51 [Alternative]

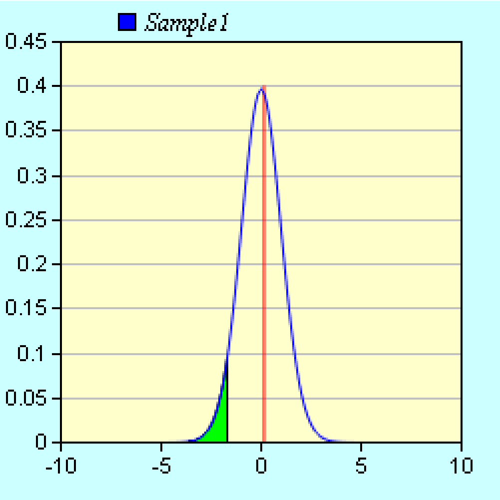
Distribution of Test Statistic

If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Decision Rule

Left Tail

Alpha	= 0.05
$t_{a, v}$	= 1.69
Accept Ho if	$-t_{\alpha, (n1+n2-2)} < t_{sample}$
Reject Ho	otherwise



Calculate Test Statistic

$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{\frac{s_p^2}{n_2} + \frac{s_p^2}{n_1}}} = 0.15$$

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

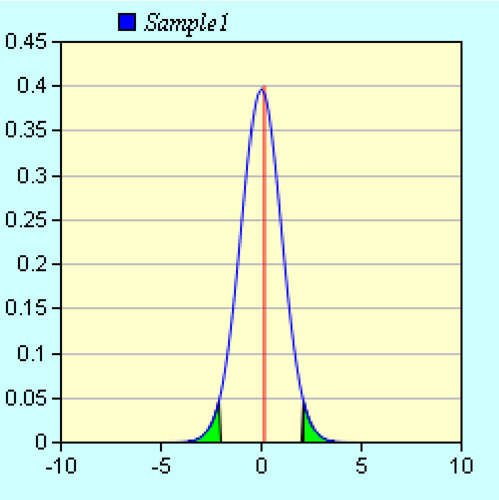
Ho Accept

Test Statistic is not significant at 0.05

If Ho is true;
$t_{a/2, v}$ is t-distributed with v degrees of freedom

Both Tails

Alpha	= 0.05
$t_{a/2, v}$	= 2.02
Accept Ho if	$-t_{\alpha/2, v} < t_{sample} < t_{\alpha/2, v}$
Reject Ho	otherwise



$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{\frac{s_p^2}{n_2} + \frac{s_p^2}{n_1}}} = 0.15$$

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

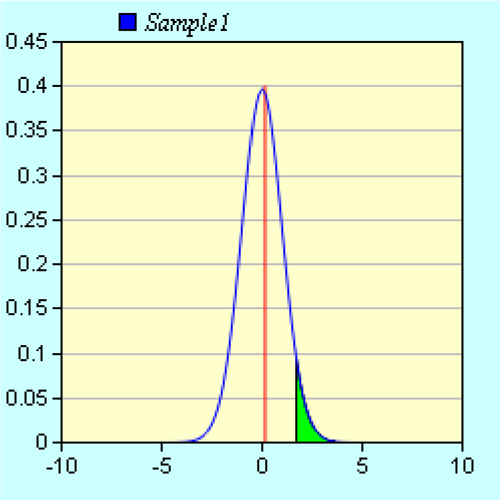
Ho Accept

Test Statistic is not significant at 0.05

If Ho is true;
$t_{a, v}$ is t-distributed with v degrees of freedom

Right Tail

Alpha	= 0.05
$t_{a, v}$	= 1.69
Accept Ho if	$t_{sample} < t_{\alpha, (n1+n2-2)}$
Reject Ho	otherwise



$$t_{Samples} = \frac{(\bar{x}_2 - \bar{x}_1)}{\sqrt{\frac{s_p^2}{n_2} + \frac{s_p^2}{n_1}}} = 0.15$$

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

Ho Accept

Test Statistic is not significant at 0.05

Conclusion

Not enough statistical evidence that the true mean is < than 5.51 .	Not enough statistical evidence that the true mean is not 5.51 .	Not enough statistical evidence that the true mean is > than 5.51 .

Hypothesis Testing

One Sample Proportion

Bawani Thambu
Acme
2007-Mar-05 : 19:39:13

Applet Introduction

Applet Details	
Applet Title	1S Proportion
Description	One Sample Proportion
Objective	To provide a method of One Sample Proportion.
Abstract	To compare a sample proportion to a population proportion.
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	1S Proportion
Team Members	

1	IR0019	Ernie Cho
2	IR0006	Azrin Othman
3	IR00115	Shree Shakthivel

Proportion : 1 - Sample Data

Mode of selection : Sample Data

Summary Data

	Sample1	Sample2
Size	{Infinity}	20
Number	{Infinity}	8.00
Proportion	0.50	0.40
Alpha	0.05	

Data

No.	Sample1	Sample2
1		0
2		0
3		0
4		0
5		0
6		0
7		0
8		0
9		1
10		1
11		1
12		1
13		1
14		1
15		1
16		1
17		1
18		1
19		1
20		1

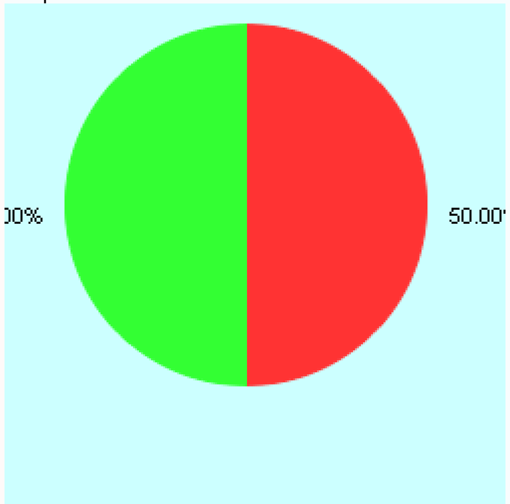
Proportion : 1 - Sample

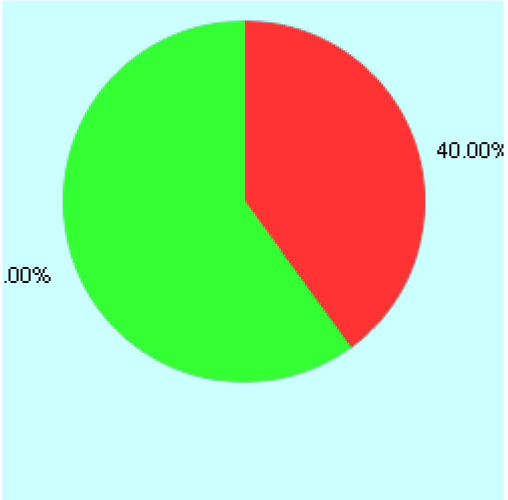
Summary Data

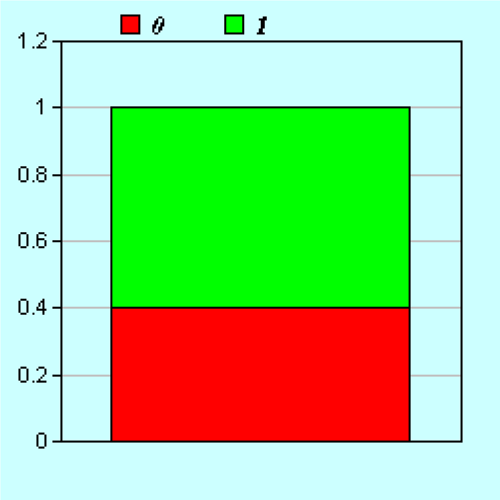
	Sample1	Sample2
Size	(Infinity)	20
Number	0.00	8.00
Proportion	0.50	0.40
Alpha	0.05	

Normal Distribution

Assumption
Population is normally distributed
Population has known mean







Hypothesis

Left Tail	Both Tails	Right Tail
Ho : π >= 0.50 [Claim]	**Ho : π =** 0.50 [Claim]	**Ho : π <=** 0.50 [Claim]
Ha : π < 0.50 [Alternative]	**Ha : π ≠** 0.50 [Alternative]	**Ha : π >** 0.50 [Alternative]

Distribution of Test Statistic

If Ho is true;
U_{α} is normally distributed

Decision Rule

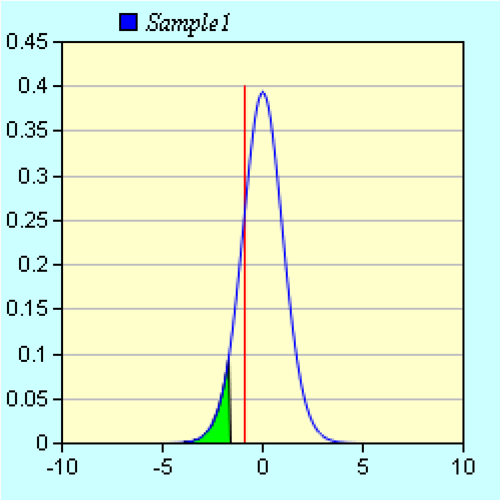
Left Tail

Alpha = 0.05

z_a = 1.65

Accept Ho if $-U_{\alpha} < U_{sample}$

Reject Ho otherwise



Calculate Test Statistic

$$Z_{Sample} = \frac{(p - \pi)}{\sqrt{\frac{\pi(1-\pi)}{n}}} = -0.89$$

Ho Accept

Test Statistic is not significant at 0.05

Conclusion

Not enough statistical evidence that the true mean is < than 0.50 .

If Ho is true;
$U_{\alpha/2}$ is normally distributed

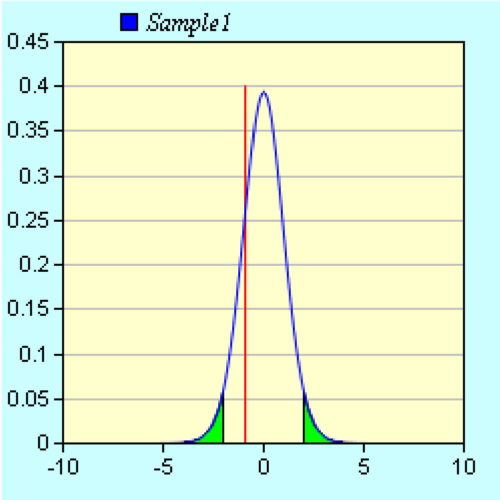
Both Tails

Alpha = 0.05

$z_{a/2}$ = 1.96

Accept Ho if $-U_{\alpha/2} < U_{sample} < U_{\alpha/2}$

Reject Ho otherwise



$$Z_{Sample} = \frac{(p - \pi)}{\sqrt{\frac{\pi(1-\pi)}{n}}} = -0.89$$

Ho Accept

Test Statistic is not significant at 0.05

Not enough statistical evidence that the true mean is not 0.50 .

If Ho is true;
U_{α} is normally distributed

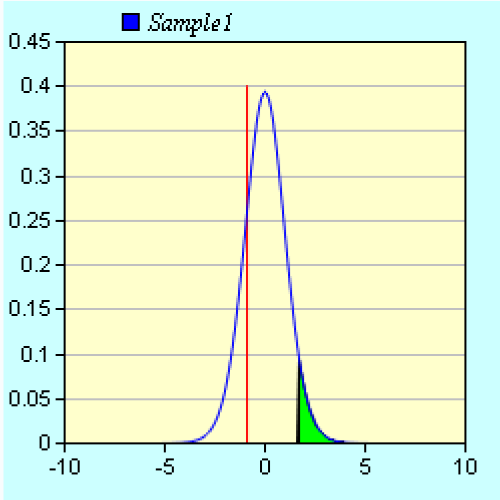
Right Tail

Alpha = 0.05

z_a = 1.65

Accept Ho if $U_{sample} < U_{\alpha}$

Reject Ho otherwise



$$Z_{Sample} = \frac{(p - \pi)}{\sqrt{\frac{\pi(1-\pi)}{n}}} = -0.89$$

Ho Accept

Test Statistic is not significant at 0.05

Not enough statistical evidence that the true mean is > than 0.50 .

Hypothesis Testing

Two Sample Proportion

Bawani Thambu
Acme
2007-Mar-05 : 19:44:23

Applet Introduction

Applet Details	
Applet Title	Two Sample Proportion
Description	Two Sample Proportion
Objective	
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	2sProp
Team Members	**1** IR0063 Liew Peng Soon **2** IR0085 Ng Thiam Seng

Proportion : 2 - Sample Data

Mode of selection : Sample Data

Summary Data

	Sample1	Sample2	Overall
Size	20	20	40
Number	9.00	14.00	23.00
Proportion	0.45	0.70	0.58
Alpha	0.05		

Sample 1 Data

No.	Sample1
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1

Sample 2 Data

No.	Sample2
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	1
16	1
17	1
18	1
19	1
20	1

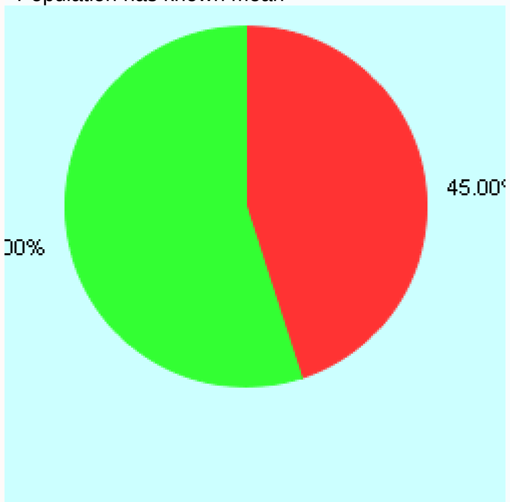
Proportion : 2 - Sample

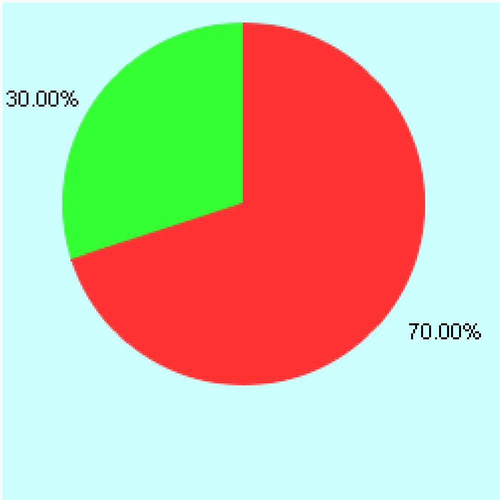
Summary Data

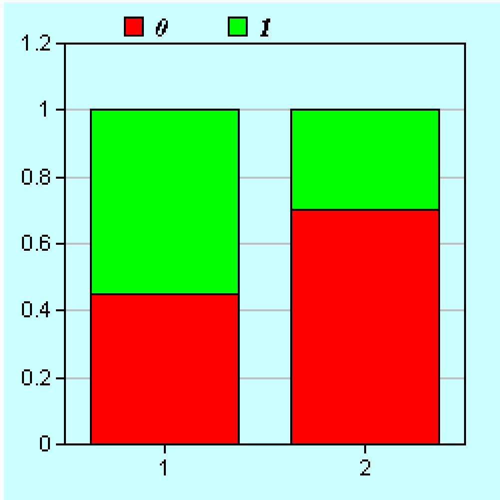
	Sample1	Sample2	Overall
Size	20	20	40.00
Number	9.00	14.00	23.00
Proportion	0.45	0.70	0.58
Alpha	0.05		

Normal Distribution

Assumption
Population is normally distributed
Population has known mean







Hypothesis

Left Tail	Both Tails	Right Tail
Ho : p2 - p1 >= 0.45 [Claim]	**Ho : p2 - p1 =** 0.45 [Claim]	**Ho : p2 - p1 <=** 0.45 [Claim]
Ha : p2 - p1 < 0.45 [Alternative]	**Ha : p2 - p1 ≠** 0.45 [Alternative]	**Ha : p2 - p1 >** 0.45 [Alternative]

Distribution of Test Statistic

If Ho is true;
U_α is normally distributed

Decision Rule

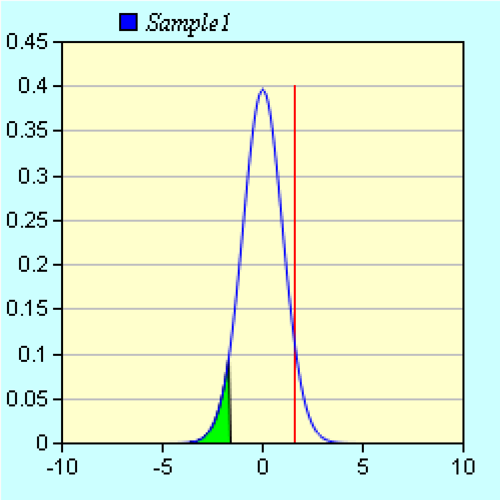
Left Tail

Alpha = 0.05

z_a = 1.65

Accept Ho if $-U_\alpha < U_{p2-p1}$

Reject Ho otherwise



Calculate Test Statistic

$$Z_{Sample} = \frac{(p_2 - p_1)}{s_{p_1-p_2}} = 1.60$$

$$s_{p_2-p_1} = \sqrt{\left(\frac{n_1p_1+n_2p_2}{n_1+n_2}\right)\times\left(1-\frac{n_1p_1+n_2p_2}{n_1+n_2}\right)\times\left(\frac{n_1+n_2}{n_1n_2}\right)}$$

Ho Accept

Test Statistic is not significant at 0.05

Conclusion

Not enough statistical evidence that the true

If Ho is true;
$U_{\alpha/2}$ is normally distributed

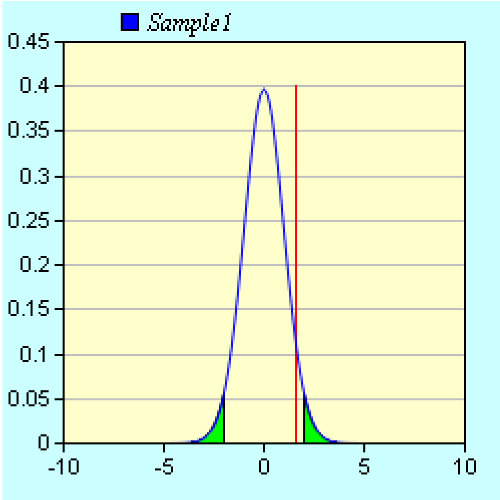
Both Tails

Alpha = 0.05

$z_{a/2}$ = 1.96

Accept Ho if $-U_{\alpha/2} < U_{p2-p1} < U_{\alpha/2}$

Reject Ho otherwise



$$Z_{Sample} = \frac{(p_2 - p_1)}{s_{p_1-p_2}} = 1.60$$

$$s_{p_2-p_1} = \sqrt{\left(\frac{n_1p_1+n_2p_2}{n_1+n_2}\right)\times\left(1-\frac{n_1p_1+n_2p_2}{n_1+n_2}\right)\times\left(\frac{n_1+n_2}{n_1n_2}\right)}$$

Ho Accept

Test Statistic is not significant at 0.05

Not enough statistical evidence that the true

If Ho is true;
U_α is normally distributed

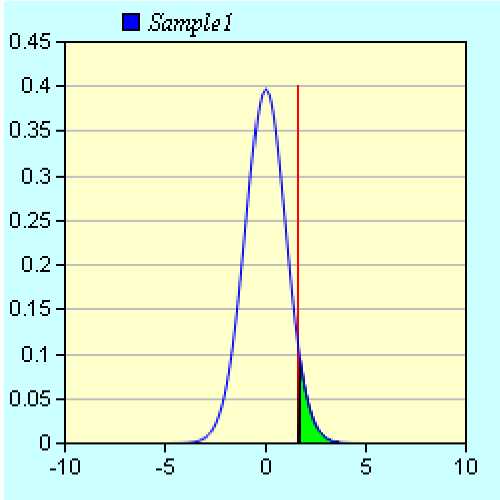
Right Tail

Alpha = 0.05

z_a = 1.65

Accept Ho if $U_{p2-p1} < U_\alpha$

Reject Ho otherwise



$$Z_{Sample} = \frac{(p_2 - p_1)}{s_{p_1-p_2}} = 1.60$$

$$s_{p_2-p_1} = \sqrt{\left(\frac{n_1p_1+n_2p_2}{n_1+n_2}\right)\times\left(1-\frac{n_1p_1+n_2p_2}{n_1+n_2}\right)\times\left(\frac{n_1+n_2}{n_1n_2}\right)}$$

Ho Accept

Test Statistic is not significant at 0.05

Not enough statistical evidence that the true

mean is < than 0.45 .	mean is not 0.45 .	mean is > than 0.45 .

Hypothesis Testing

One-Way Anova

Bawani Thambu
Acme
2007-Mar-05 : 19:56:34

Applet Introduction

Applet Details	
Applet Title	One-Way Anova
Description	One-Way Anova
Objective	
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	1Anova
Team Members	**1** IR0098 Rohaida Mahrin **2** IR0097 Rexon Wong

Analysis of Variance 1 Factor Data

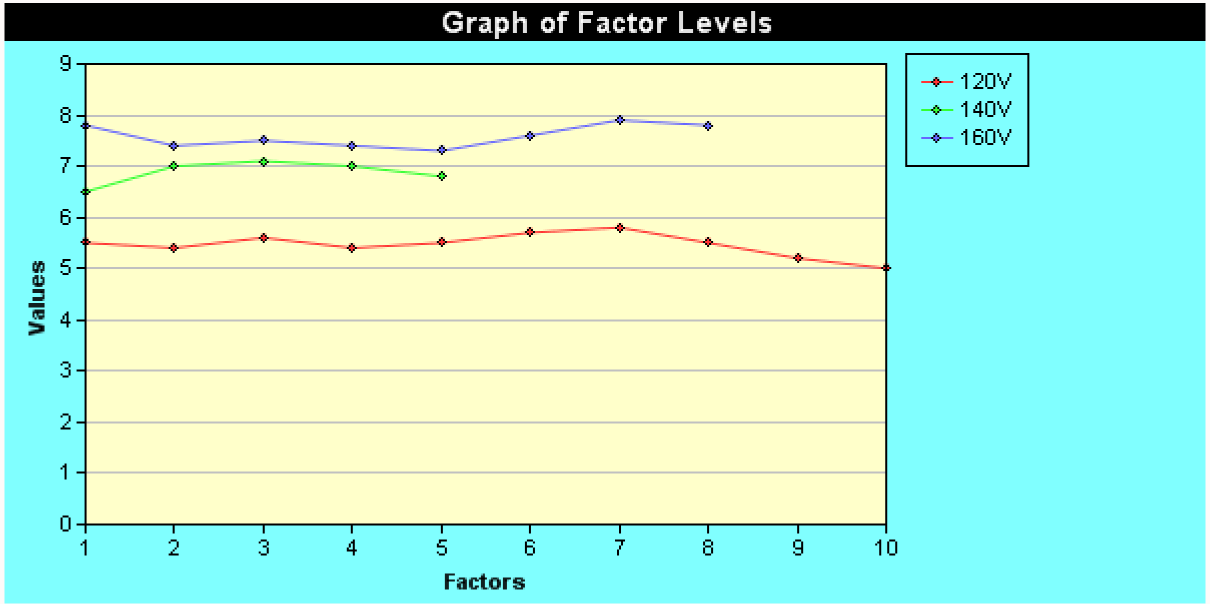
Response	Solderability
Unit	Force (kN)
Alpha	0.05

Sample Data

	120V	140V	160V
1	5.50	6.50	7.80
2	5.40	7.00	7.40
3	5.60	7.10	7.50
4	5.40	7.00	7.40
5	5.50	6.80	7.30
6	5.70		7.60
7	5.80		7.90
8	5.50		7.80
9	5.20		
10	5.00		

Analysis of Variance 1 Factor

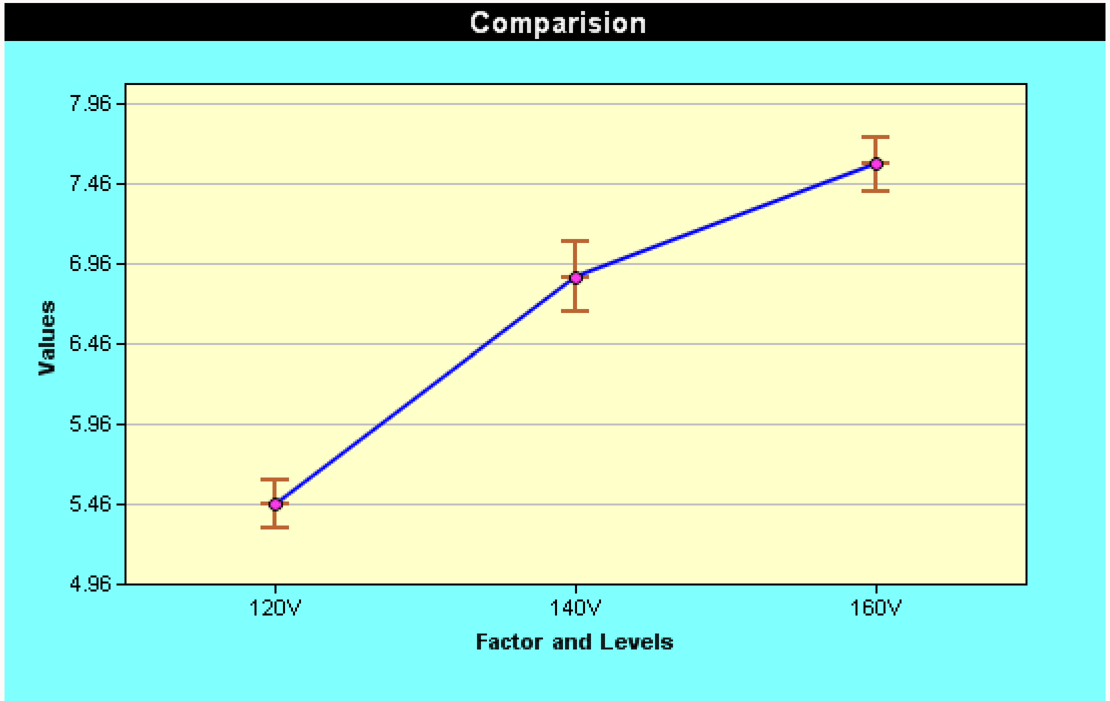
	120V	140V	160V	Total
Size	10	5	8	23
Mean	5.46	6.88	7.59	6.51
Variance	0.05	0.06	0.05	0.05
Alpha	0.05			



Source	SS	df	MS	F	ss	Rho
Between Groups	21.00	2	10.50	197.95	20.94	94.95
Within	1.06	20	0.05			
St	22.06	22				
Sm	974.35	1				
ST	996.41	23				

Confidence Intervals

120V	5.46	5.31	5.61	0.15
140V	6.88	6.67	7.09	0.21
160V	7.59	7.42	7.76	0.17



Hypothesis Testing

Two-Way Anova

Bawani Thambu
Acme
2007-Mar-05 : 20:05:45

Applet Introduction

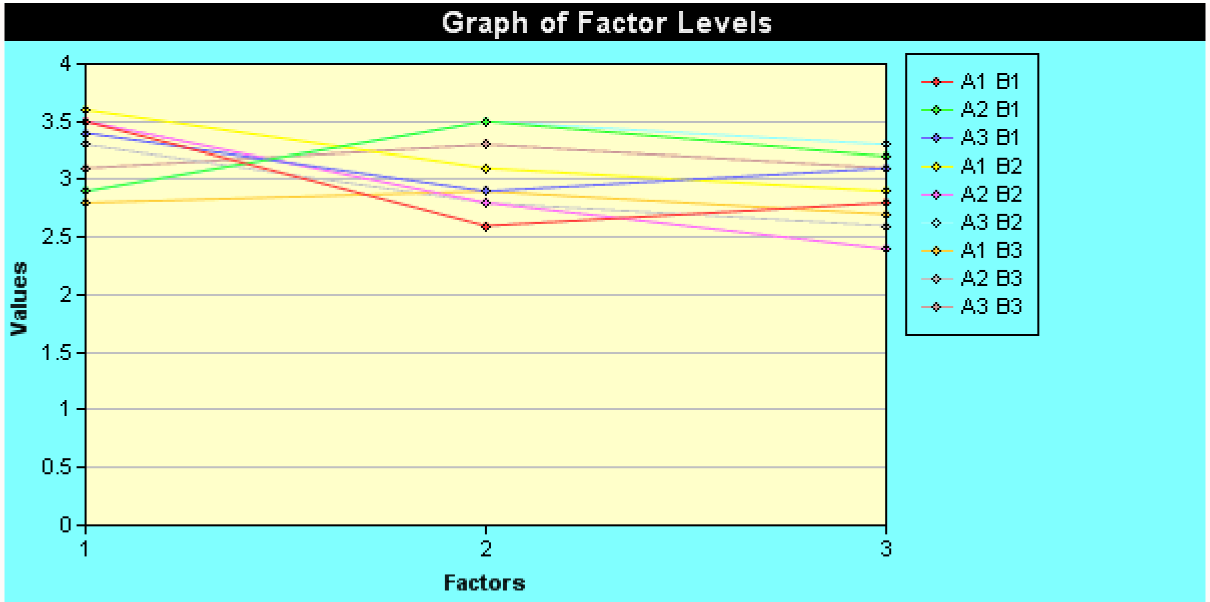
Applet Details	
Applet Title	Two-Way Anova
Description	Two-Way Anova
Objective	
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	2ATeam
Team Members	**1** IR0028 Halim Halim **2** IR0095 Ramesh Murugan

Anova 2 Factor Data

Response	Solderability
Unit	Part per Million
Observations	3

Sample Data

			Temp		
			A1	**A2**	**A3**
Pressure	B1	1	3.50	2.90	3.40
		2	2.60	3.50	2.90
		3	2.80	3.20	3.10
	B2	1	3.60	3.50	2.90
		2	3.10	2.80	3.50
		3	2.90	2.40	3.30
	B3	1	2.80	3.30	3.10
		2	2.90	2.80	3.30
		3	2.70	2.60	3.10


Graph of Factor Levels
Values
Factors
0
0.5
1
1.5
2
2.5
3
3.5
4
1
2
3
A1 B1
A2 B1
A3 B1
A1 B2
A2 B2
A3 B2
A1 B3
A2 B3
A3 B3

Anova 2 Factor Response Tables

Response	Solderability
Unit	Part per Million
Observations	3

Averages

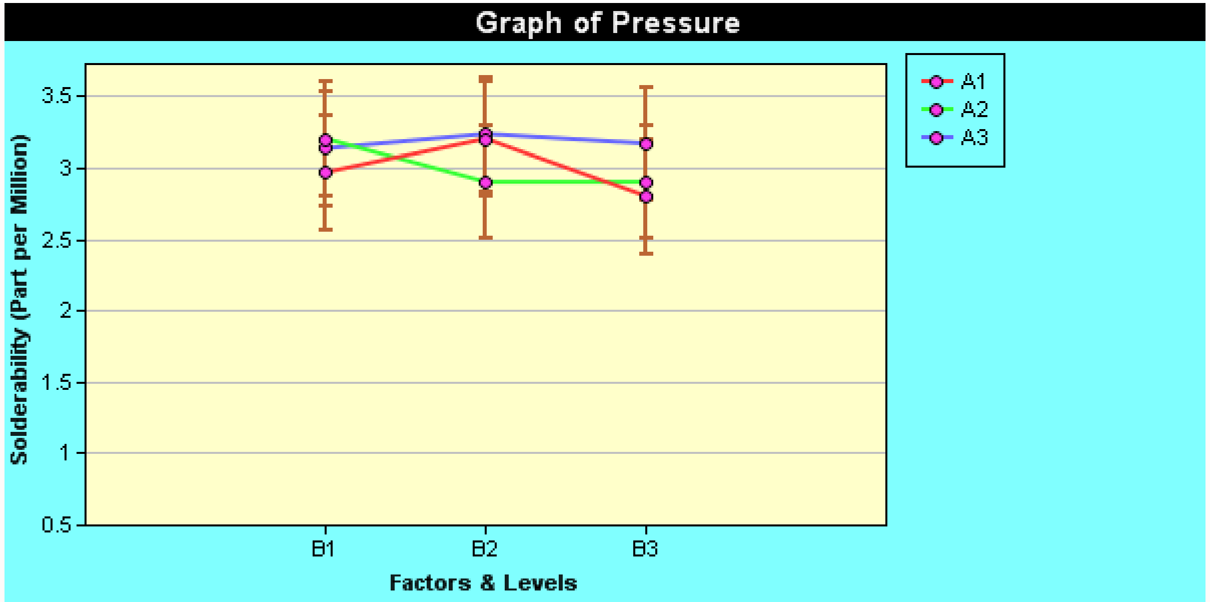
	Temp	Pressure		B1	B2	B3
Level 1	2.99	3.10	**A1**	2.97	3.20	2.80
Level 2	3.00	3.11	**A2**	3.20	2.90	2.90
Level 3	3.18	2.96	**A3**	3.13	3.23	3.17

Counts

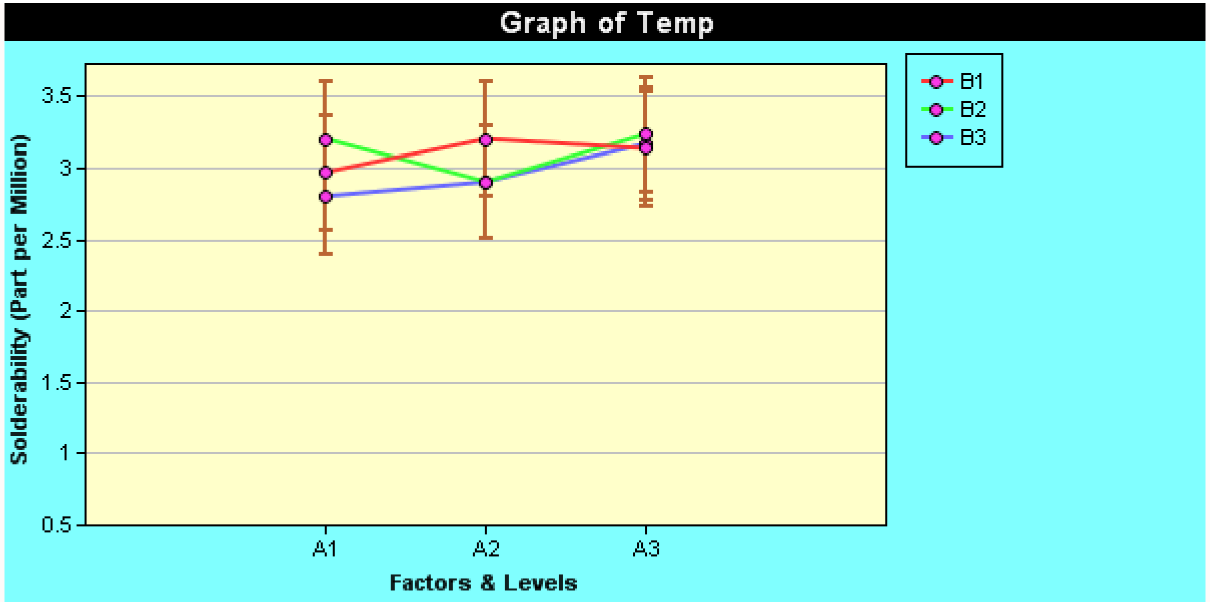
	Temp	Pressure		B1	B2	B3
Level 1	9	9	**A1**	3	3	3
Level 2	9	9	**A2**	3	3	3
Level 3	9	9	**A3**	3	3	3

Confidence Intervals

	A1	A2	A3
B1	0.40	0.40	0.40
B2	0.40	0.40	0.40
B3	0.40	0.40	0.40



Graph of Pressure
Solderability (Part per Million)
3.5
3
2.5
2
1.5
1
0.5
B1
B2
B3
Factors & Levels
A1
A2
A3


Graph of Temp
Solderability (Part per Million)
3.5
3
2.5
2
1.5
1
0.5
A1
A2
A3
Factors & Levels
B1
B2
B3

Anova 2 Factor

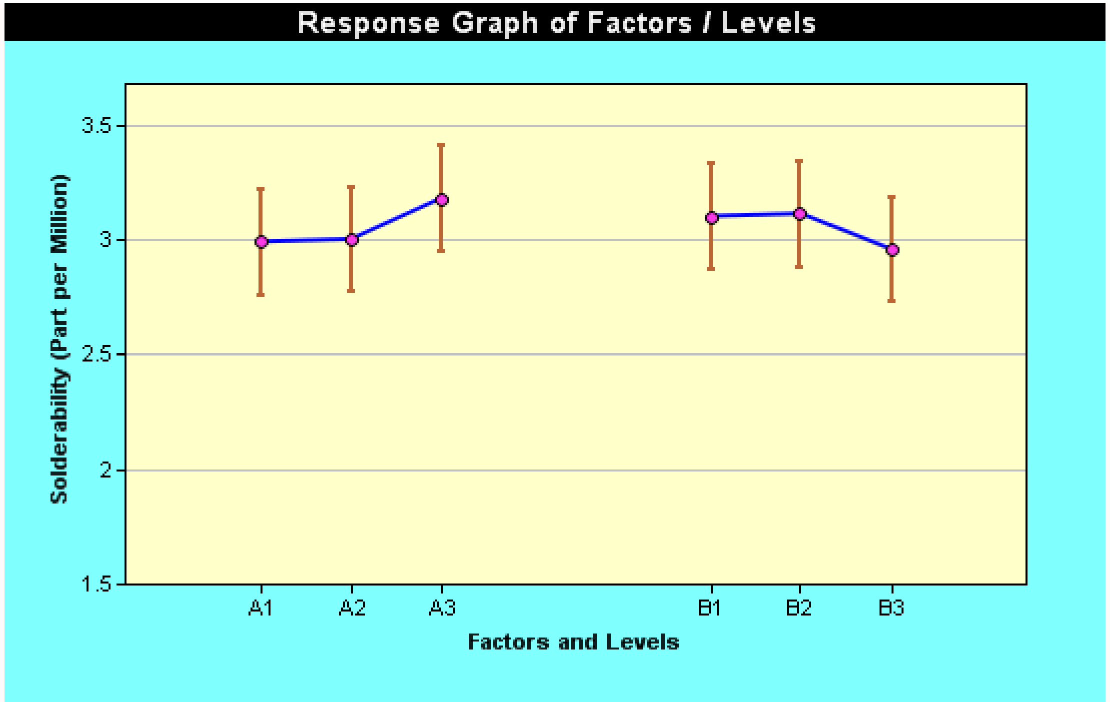
Anova 2 Factor With Replication

Source	Pool	SS	df	MS	F	Ss	Rho
Temp	0	0.20	2	0.10	0.92	0.20	0.07
Pressure	0	0.14	2	0.07	0.61	0.14	0.05
Temp X Pressure	1	0.30	4	0.08	0.68		
Within	1	2.13	18	0.12	1.07		
Pool		2.43	22	0.11	1.00	2.43	0.88
St		2.77	26			2.77	1.00
Sm		252.08	1				
ST		254.85	27				

Confidence Intervals

	Temp			
A1	2.99	2.76	3.22	0.23
A2	3.00	2.77	3.23	0.23
A3	3.18	2.95	3.41	0.23

	Pressure			
B1	3.10	2.87	3.33	0.23
B2	3.11	2.88	3.34	0.23
B3	2.96	2.73	3.19	0.23


Response Graph of Factors / Levels
Solderability (Part per Million)
3.5
3
2.5
2
1.5
A1
A2
A3
B1
B2
B3
Factors and Levels

Hypothesis Testing

Goodness-of-Fit

Bawani Thambu
Acme
2007-Mar-05 : 20:09:47

Applet Introduction

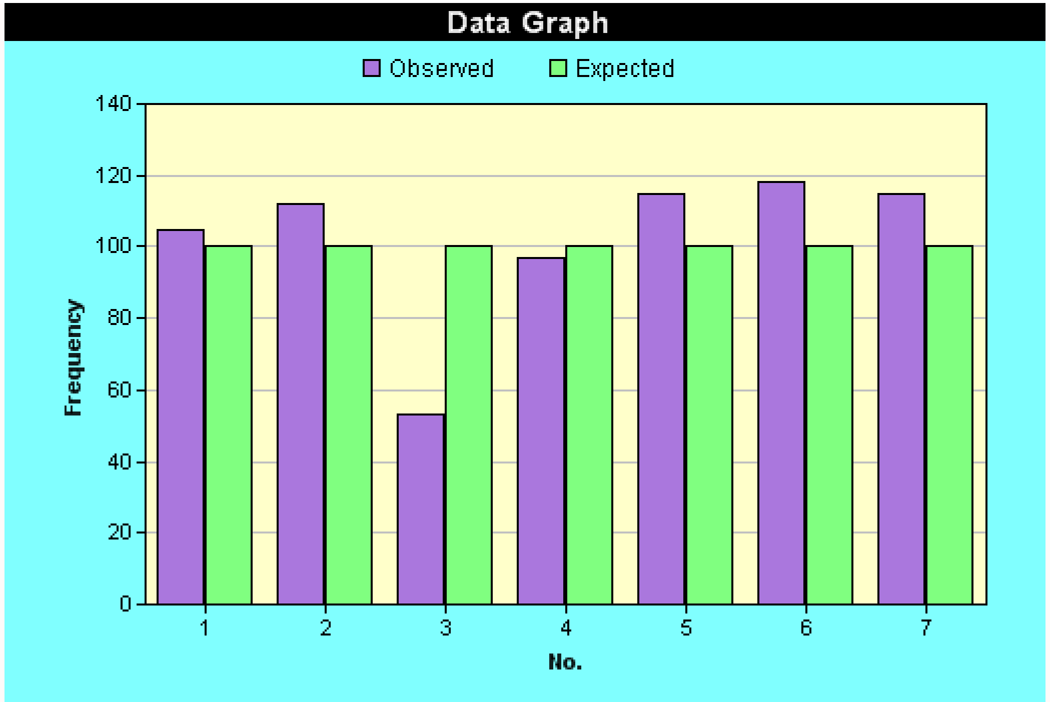
Applet Details	
Applet Title	Goodness-of-Fit
Description	Goodness-of-Fit
Objective	
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	Gteam
Team Members	

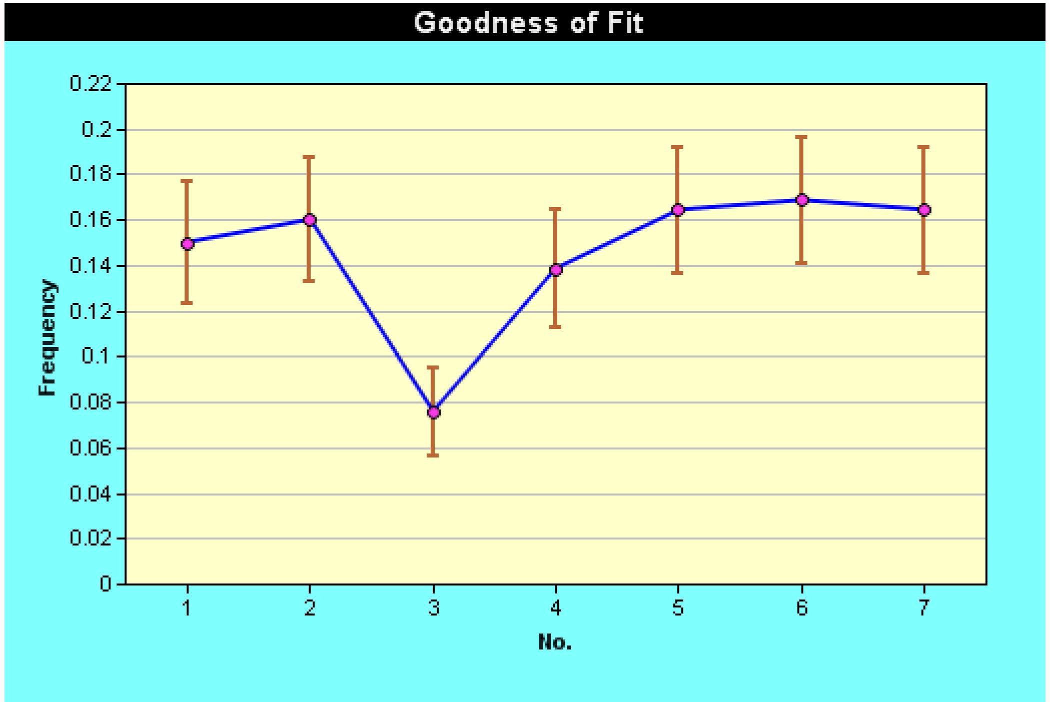
1	IR0098	Rohaida Mahrin
2	IR0099	Phoana Thebes

Chi - Squared GOF Data

Selection	Unequal Expected Values
Alpha	0.05

	Frequency						
No.	**Observed**	**Expected**	**Calc. Test Stat.**	**Lower Limit**	**Mid Value**	**Upper Limit**	**Test**
1	105.00	100.00	0.25	0.12	0.15	0.18	Ok
2	112.00	100.00	1.44	0.13	0.16	0.19	Ok
3	53.00	100.00	22.09	0.06	0.08	0.10	Ok
4	97.00	100.00	0.09	0.11	0.14	0.16	Ok
5	115.00	100.00	2.25	0.14	0.16	0.19	Ok
6	118.00	100.00	3.24	0.14	0.17	0.20	Ok
7	115.00	100.00	2.25	0.14	0.16	0.19	Ok
	715.00	**700.00**	**31.61**				


Data Graph
Observed
Expected
Frequency
140
120
100
80
60
40
20
0
1
2
3
4
5
6
7
No.


Goodness of Fit
Frequency
No.
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1
2
3
4
5
6
7

Chi - Squared GOF

Assumption
A key assumption of the chi square test of independence is that each subject contributes data to only one cell. Therefore the sum of all cell frequencies in the table must be the same as the number of subjects in the experiment. Use of the chi-square tests is inappropriate if any expected frequency is below 1 or if the expected frequency is less than 5 in more than 20% of cells.

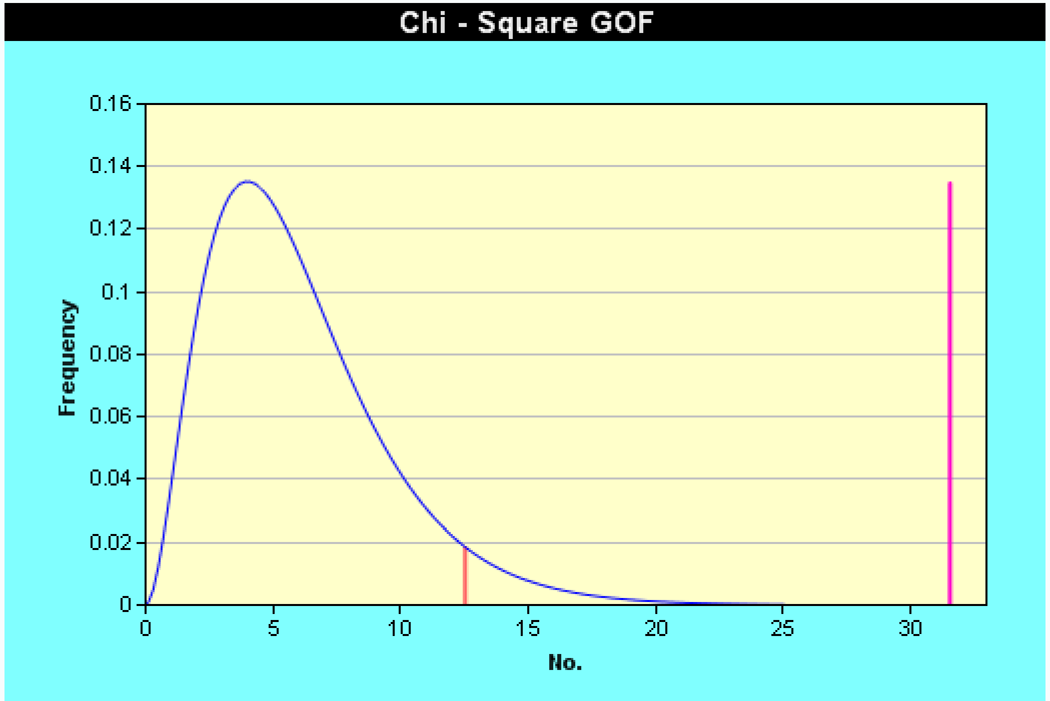
Hypothesis
Right tail (only)
Ho : There is a good fit [Claim]
Ha : There is not a good fit [Alternative]

Distribution of Test Statistic
If Ho is true;
X^2_v is Chi-square -distributed with v degrees of freedom

Decision Rule

Alpha	=	0.05
Degree Of Freedom	=	6
X^2_v	=	12.59
Accept Ho if	=	$X^2_{sample} < X^2_{\alpha,v}$
Reject Ho	=	Otherwise

Calculate Test Statistic
X^2_v Calculate = 31.61



Statistical Decision
Ho : Reject
Test Statistic is significant at 0.05.

Conclusion
There is not a good fit

Hypothesis Testing

Test-of-Independence

Bawani Thambu
Acme
2007-Mar-05 : 20:13:24

Applet Introduction

Applet Details	
Applet Title	Test-of-Independence
Description	Test-of-Independence
Objective	
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	TOI
Team Members	**1** IR0098 Rohaida Mahrin **2** IR0088 Norzam Ahmad

Chi - Squared TOI Data

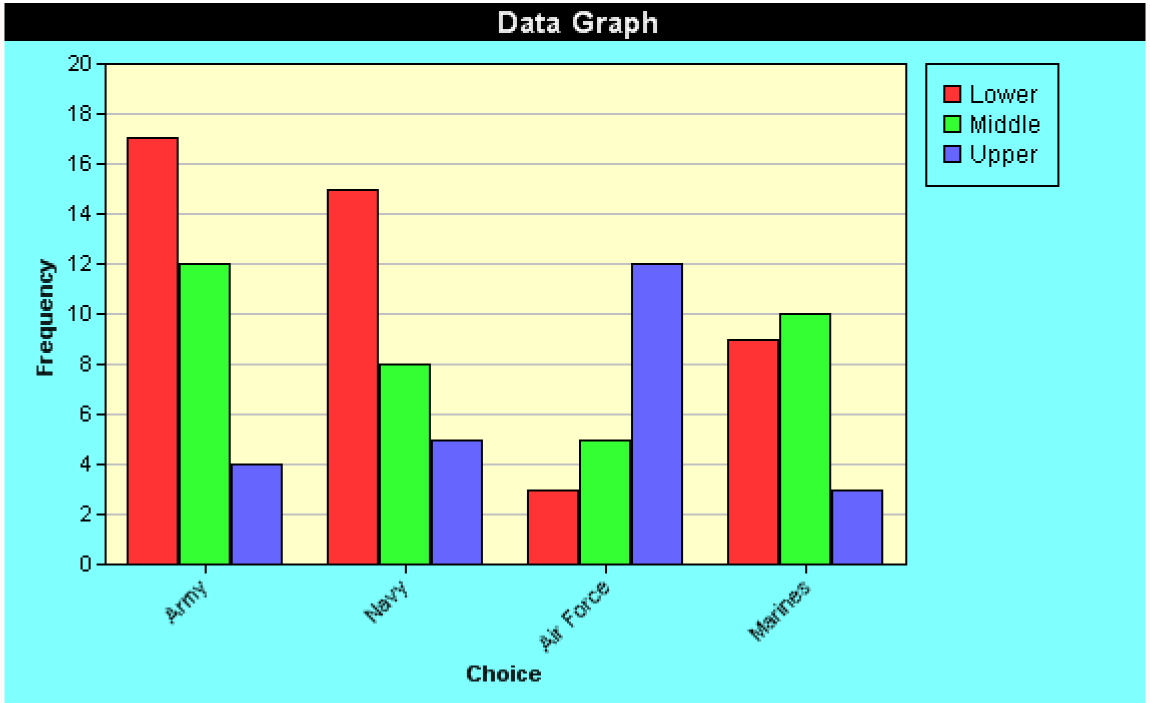
Alpha	0.05

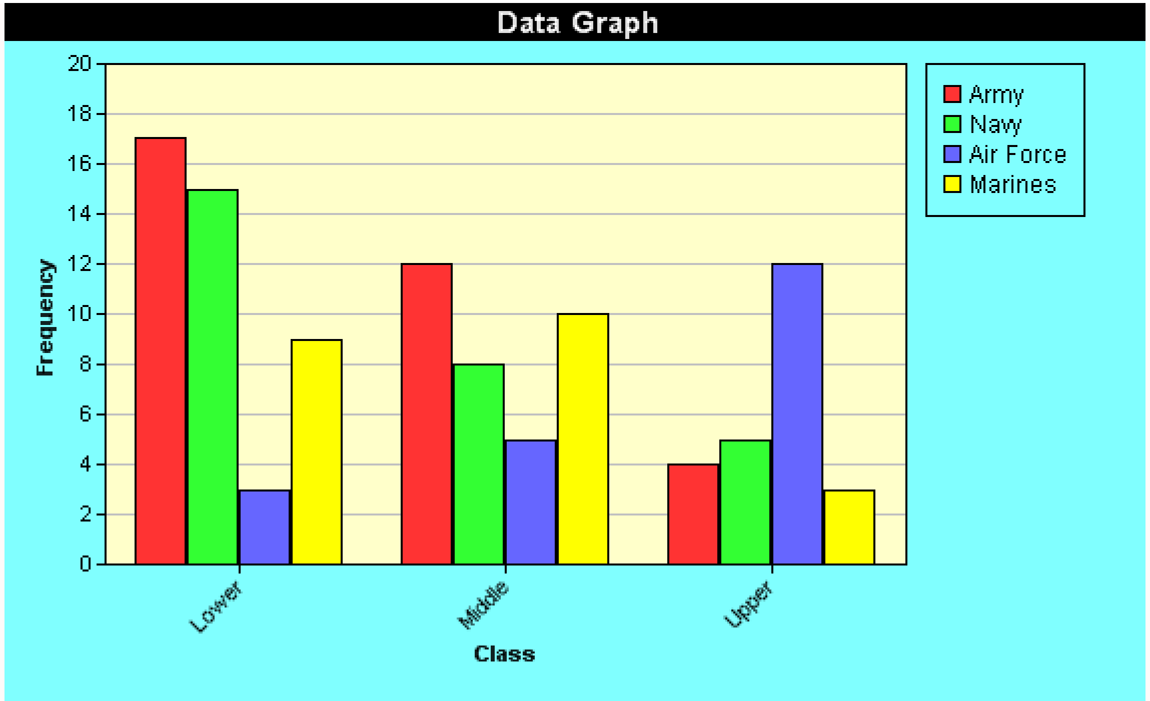
Observed Values

			Class			
			Lower	Middle	Upper	
Choice	1	Army	17.00	12.00	4.00	**33.00**
	2	Navy	15.00	8.00	5.00	**28.00**
	3	Air Force	3.00	5.00	12.00	**20.00**
	4	Marines	9.00	10.00	3.00	**22.00**
			44.00	**35.00**	**24.00**	**103.00**

Expected Values

			Class			
			Lower	Middle	Upper	
Choice	1	Army	14.10	11.21	7.69	**33.00**
	2	Navy	11.96	9.51	6.52	**28.00**
	3	Air Force	8.54	6.80	4.66	**20.00**
	4	Marines	9.40	7.48	5.13	**22.00**
			44.00	**35.00**	**24.00**	**103.00**


Data Graph
Frequency
20
18
16
14
12
10
8
6
4
2
0
Army
Navy
Air Force
Marines
Choice
Lower
Middle
Upper


Data Graph
Frequency
20
18
16
14
12
10
8
6
4
2
0
Lower
Middle
Upper
Class
Army
Navy
Air Force
Marines

Chi - Squared TOI

Assumption
A key assumption of the chi square test of independence is that each subject contributes data to only one cell. Therefore the sum of all cell frequencies in the table must be the same as the number of subjects in the experiment. Use of the chi-square tests is inappropriate if any expected frequency is below 1 or if the expected frequency is less than 5 in more than 20% of cells.

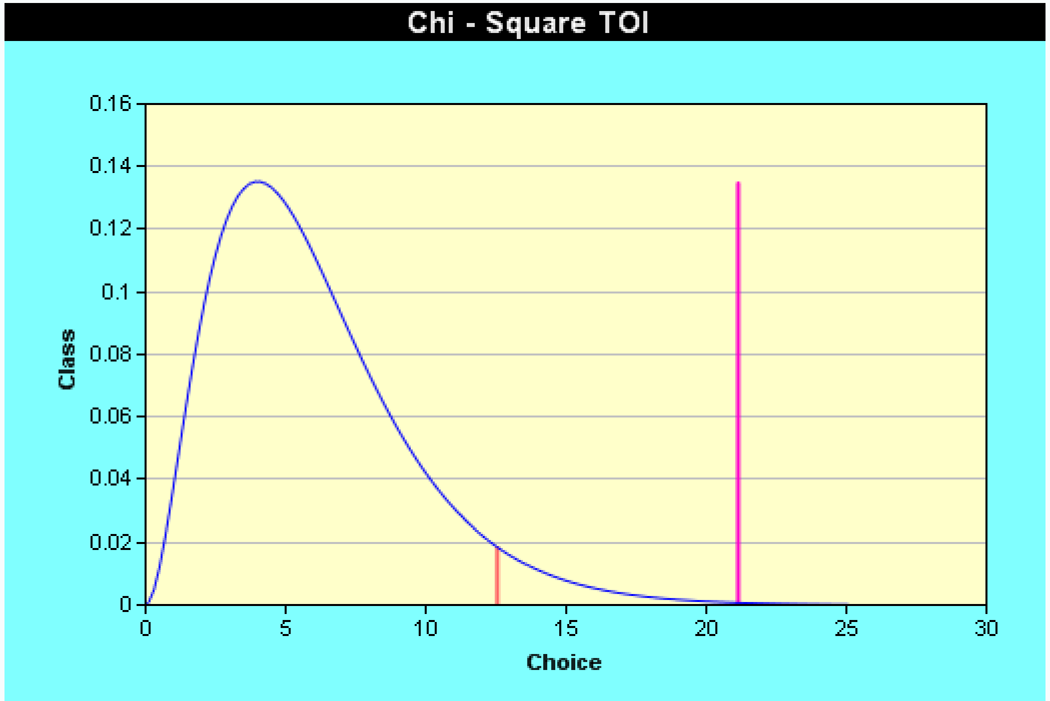
Hypothesis
Right tail (only)
Ho : Choice and Class are independent. [Claim]
Ha : Choice and Class are not independent. [Alternative]

Distribution of Test Statistic
If Ho is true;
X^2_v is Chi-square -distributed with v degrees of freedom

Decision Rule
Alpha = 0.05
Degree Of Freedom = 6
X^2_v = 12.59
Accept Ho if = $X^2_{sample} < X^2_{\alpha,v}$
Reject Ho = Otherwise

Calculate Test Statistic

			Class			
			Lower	Middle	Upper	
Choice	1	Army	0.60	0.06	1.77	**2.42**
	2	Navy	0.77	0.24	0.36	**1.37**
	3	Air Force	3.60	0.47	11.56	**15.63**
	4	Marines	0.02	0.85	0.88	**1.75**
			4.98	**1.62**	**14.57**	**21.18**



Statistical Decision
Ho : Reject
Test Statistic is significant at 0.05.

Conclusion
Choice and Class are not independent.

Hypothesis Testing

Chi-1s Variance

Bawani Thambu
Acme
2007-Mar-05 : 20:18:24

Applet Introduction

Applet Details	
Applet Title	Chi-1sVariance
Description	Chi-1s Variance
Objective	Ch- 1 Sample variance
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	
Team Members	**1** IR0099 Phoana Thebes

Chi - Squared : 1 Sample (Variance) Data

Mode of selection : Sample Data

Summary Data

	Population	Sample2
Size	{Infinity}	15
Mean		18.80
Variance	64.00	124.03
Alpha	0.05	

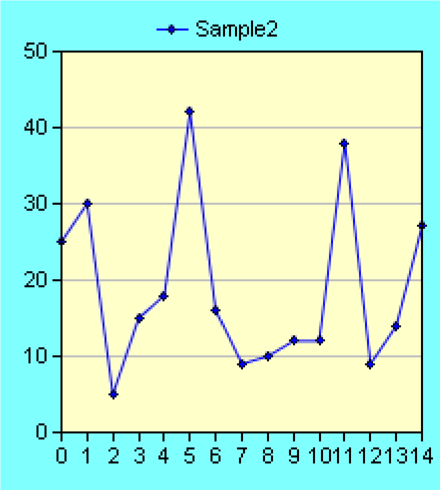
Data

No.	Population	Sample2
1		25.00
2		30.00
3		5.00
4		15.00
5		18.00
6		42.00
7		16.00
8		9.00
9		10.00
10		12.00
11		12.00
12		38.00
13		9.00
14		14.00
15		27.00
16		
17		
18		
19		

Chi - Squared : 1 Sample (Variance)

Assumption

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.



Hypothesis

Left Tail

Ho : µ = 64.00 [Alternative]
Ha : µ < 64.00 [Claim]

Distribution of Test Statistic

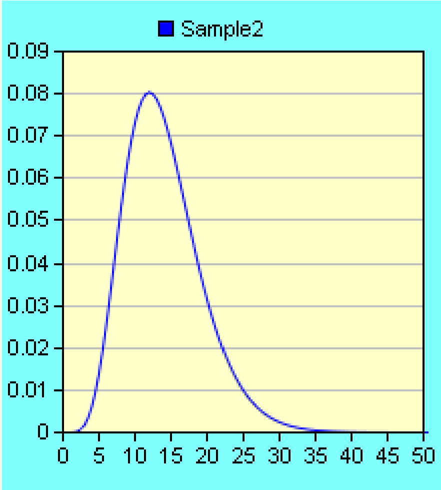
$X^2_{\alpha,n} = (n-1)\, s^2 / s^2$

If Ho is true
$t_{a,v}$ is t-distributed with v degrees of freedom

Decision Rule

Alpha = 0.95
X^2_v = 6.57

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.



Both Tails

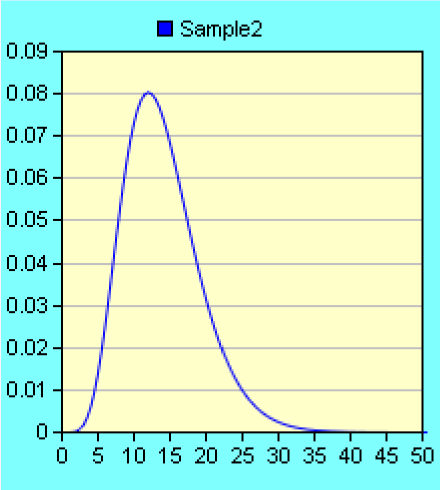
Ho : µ = 64.00 [Claim]
Ha : µ ? 64.00 [Alternative]

$X^2_{\alpha/2,n} = (n-1)\, s^2 / s^2$

If Ho is true
$t_{a/2,v}$ is t-distributed with v degrees of freedom

Alpha = 0.975 0.025
X^2_v = 5.63 26.12

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.



Right Tail

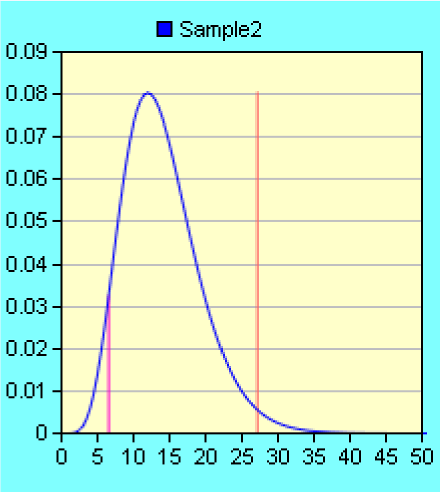
Ho : µ = 64.00 [Alternative]
Ha : µ > 64.00 [Claim]

$X^2_{\alpha,n} = (n-1)\, s^2 / s^2$

If Ho is true
$t_{a,v}$ is t-distributed with v degrees of freedom

Alpha = 0.05
X^2_v = 23.68

Accept Ho if $X^2_{1-\alpha,v} < X^2_{sample}$
Reject Ho otherwise



Calculate Test Statistic

$$X^2_{Sample} = \frac{(n-1)s^2}{\sigma^2} = 27.13$$

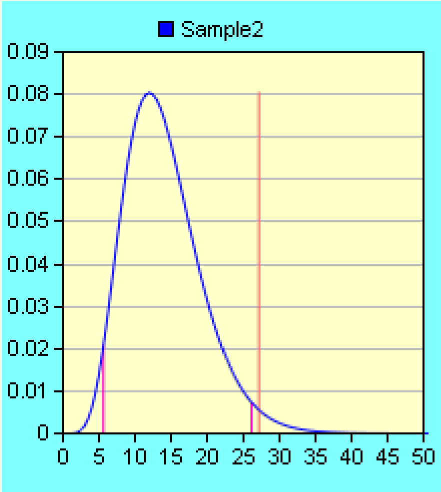
Statistical Decision

Ho Accept
Test Statistic is not significant at 0.05%

Conclusion

Not enough statistical evidence that the true variance is < than 64.00.

Accept Ho if $X^2_{1-\alpha/2,v} < X^2_{sample} < X^2_{\alpha/2,v}$
Reject Ho otherwise

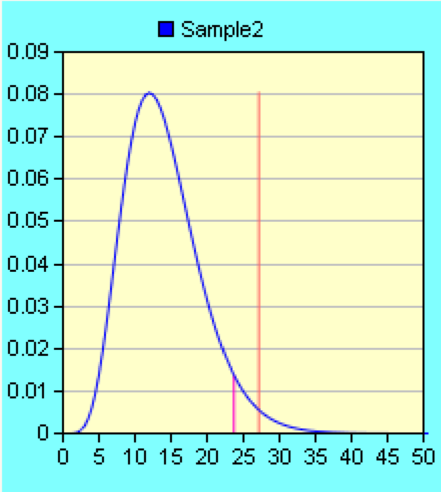


$$X^2_{Sample} = \frac{(n-1)s^2}{\sigma^2} = 27.13$$

Ho Reject
Test Statistic is significant at 0.05%

Enough statistical evidence that the true variance is not 64.00.

Accept Ho if $X^2_{sample} < X^2_{\alpha,v}$
Reject Ho otherwise



$$X^2_{Sample} = \frac{(n-1)s^2}{\sigma^2} = 27.13$$

Ho Reject
Test Statistic is significant at 0.05%

Enough statistical evidence that the true variance is not 64.00.

Hypothesis Testing

Ch-2 Sample

Bawani Thambu
Acme
2007-Mar-05 : 20:38:49

Applet Introduction

Applet Details	
Applet Title	Chi-2s
Description	Ch-2 Sample
Objective	Chi-=2 Sample Variance
Abstract	
Team Leader	Bawani Thambu
Commencement Date	05-Mar-2007
Expected Completion Date	
Completion Date	
Status	Not Completed
Team Name	2sVar
Team Members	

1	IR0088	Norzam Ahmad
2	IR0001	Amina Hameed

Chi - Squared : 2 - Sample (Variance) Data

Mode of selection : Sample Values [Mean, Variance]

Summary Data

	Sample1	Sample2
Size	14	16
Mean	5.56	5.71
Variance	0.50	0.45
Alpha	0.05	

Chi - Squared : 2 Sample (Variance)

Assumption

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.

Hypothesis

Left Tail
Ho : µ = 0.50 [Alternative]
Ha : µ < 0.50 [Claim]

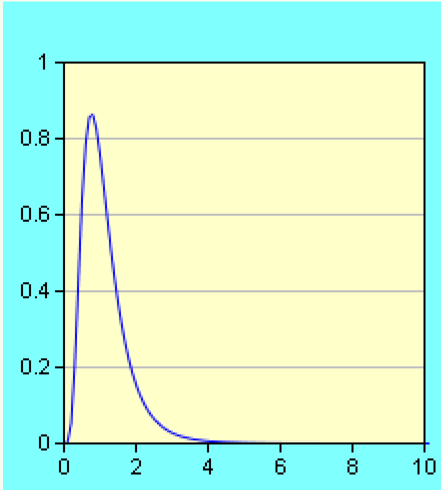
Distribution of Test Statistic

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a,v1,v2}$ is F-distributed with v degrees of freedom

Decision Rule

Alpha = 0.95
$F_{1-a,n1,n2}$ = 0.38

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.

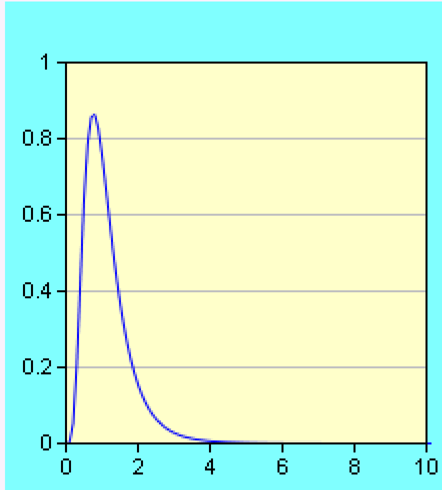


Both Tails
Ho : µ = 0.50 [Claim]
Ha : µ ? 0.50 [Alternative]

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a/2,v1,v2}$ is F-distributed with v degrees of freedom

Alpha = 0.975 0.025
$F_{1-a,n1,n2}$ = 0.31 2.96
Accept Ho if $F_{1-\alpha/2,v1,v2} < F_{sample} < F_{\alpha/2,v1,v2}$

Population is normally distributed.
Population has known mean.
Sample is randomly selected.
Observations are independent.



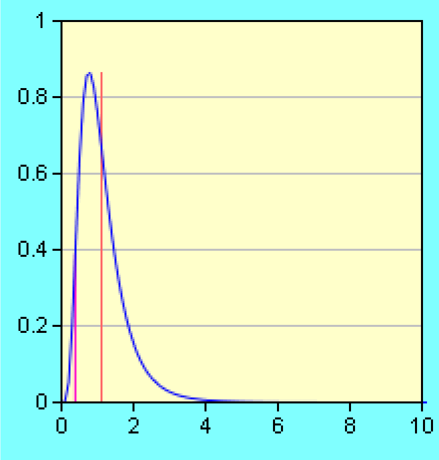
Right Tail
Ho : µ = 0.50 [Alternative]
Ha : µ > 0.50 [Claim]

$F_{\alpha,n1,n2} = (s_{larger})^2 / (s_{smaller})^2$
If Ho is true
$F_{a,v1,v2}$ is F-distributed with v degrees of freedom

Alpha = 0.05
$F_{a,n1,n2}$ = 2.48
Accept Ho if $F_{sample} < F_{\alpha,v1,v2}$

Accept Ho if $F_{1-\alpha,v1,v2} < F^2_{sample}$

Reject Ho otherwise



Calculate Test Statistic

$$F_{Sample} = \frac{s_1^2}{s_2^2} = 1.11$$

Statistical Decision

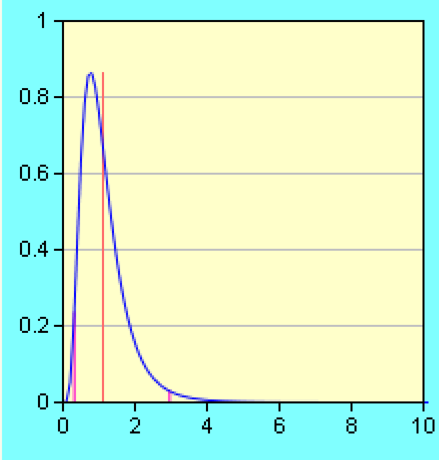
Ho Accept

Test Statistic is not significant at 0.05%

Conclusion

Not enough statistical evidence that the true variance is < than 0.50.

Reject Ho otherwise



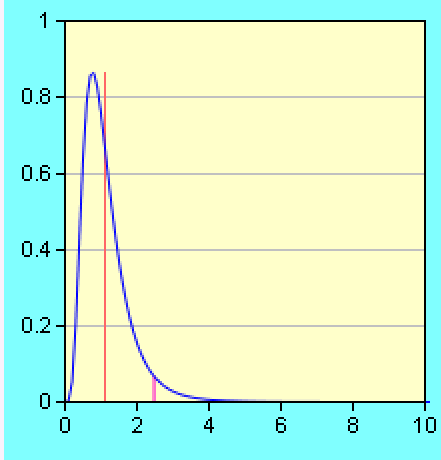
$$F_{Sample} = \frac{s_1^2}{s_2^2} = 1.11$$

Ho Accept

Test Statistic is not significant at 0.05%

Not enough statistical evidence that the true variance is not 0.50.

Reject Ho otherwise



$$F_{Sample} = \frac{s_1^2}{s_2^2} = 1.11$$

Ho Accept

Test Statistic is not significant at 0.05%

Not enough statistical evidence that the true variance is not 0.50.