

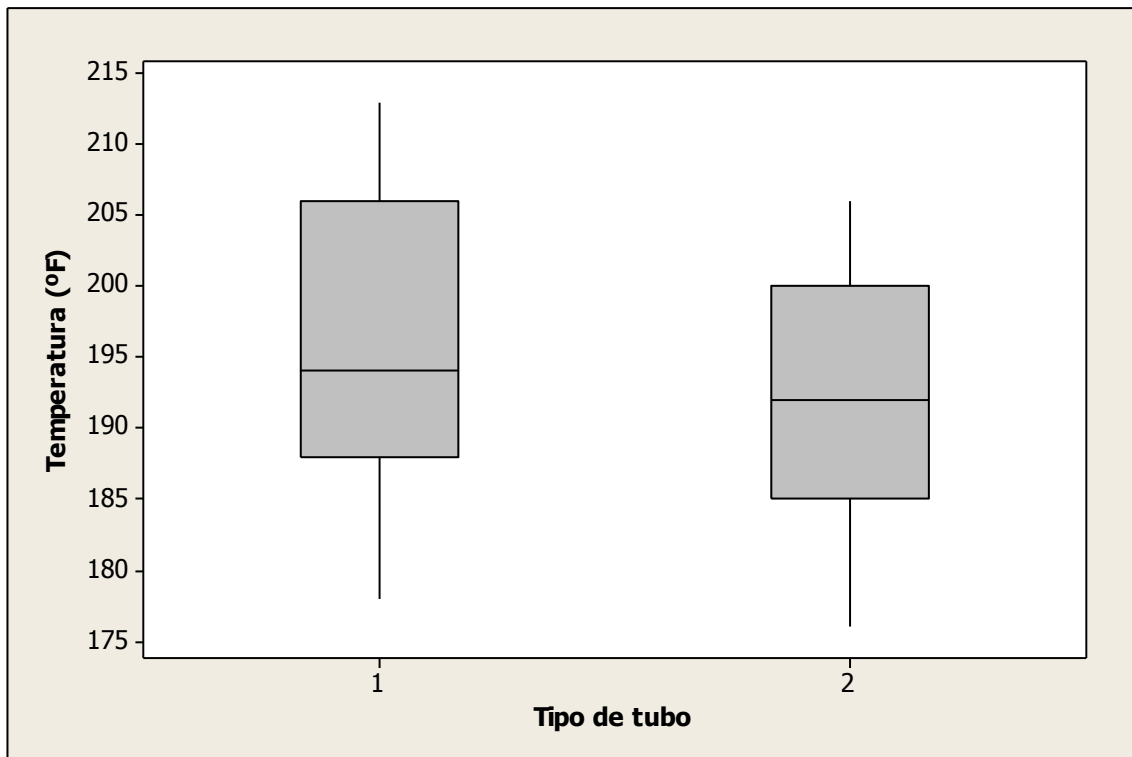
Lista nº 3 – Inferência Estatística para 2 Amostras
Algumas Soluções Computacionais

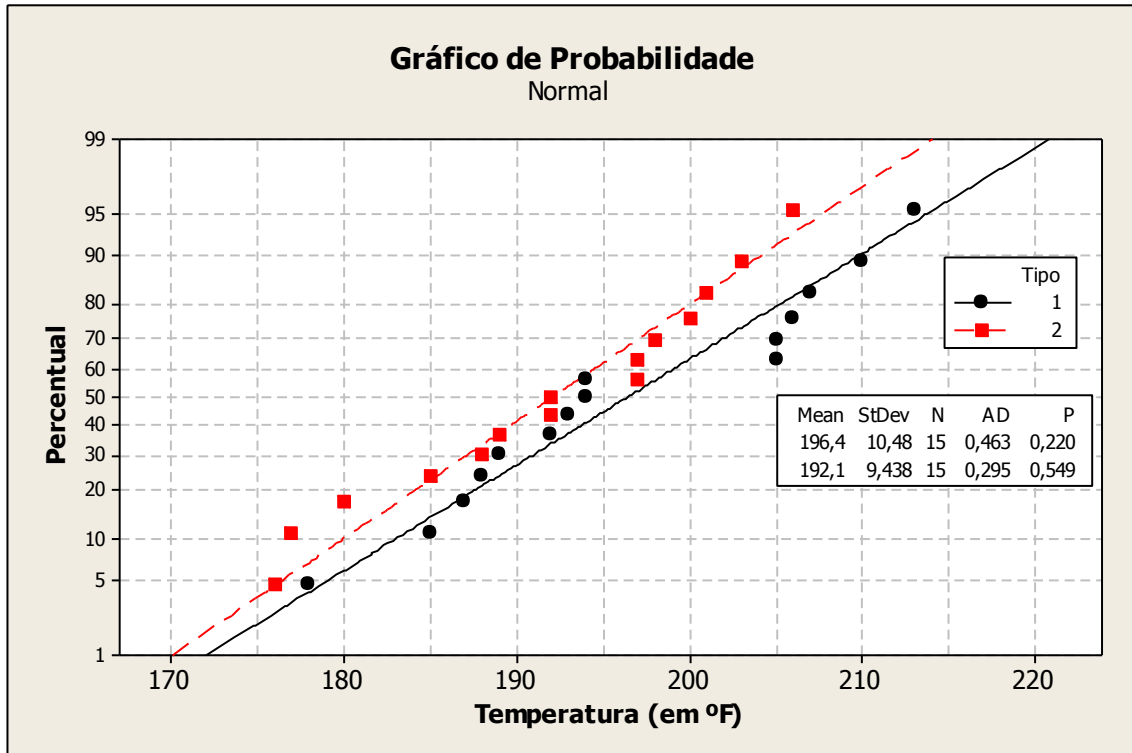
Exercício 5-1:

Descriptive Statistics: Volume

Variable	Máquina	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median
Volume	1	10	0	16,015	0,00957	0,0303	15,960	15,988	16,020
	2	10	0	16,005	0,00806	0,0255	15,960	15,985	16,010
Variable	Máquina	Q3	Maximum						
Volume	1	16,043	16,050						

Exercício 5-16.





Two-Sample T-Test and CI: Temperatura; Tipo

Two-sample T for Temperatura

Tipo	N	Mean	StDev	SE Mean
1	15	196,4	10,5	2,7
2	15	192,07	9,44	2,4

Difference = mu (1) - mu (2)
 Estimate for difference: 4,33
 95% upper bound for difference: 10,53
 T-Test of difference = 0 (vs <): T-Value = 1,19 P-Value = 0,878 DF = 28
 Both use Pooled StDev = 9,9723

Power and Sample Size

2-Sample t Test

Testing mean 1 = mean 2 (versus <)
 Calculating power for mean 1 = mean 2 + difference
 Alpha = 0,05 Assumed standard deviation = 9,9723

Difference	Sample Size	Power
-5	15	0,380196

The sample size is for each group.

Power and Sample Size

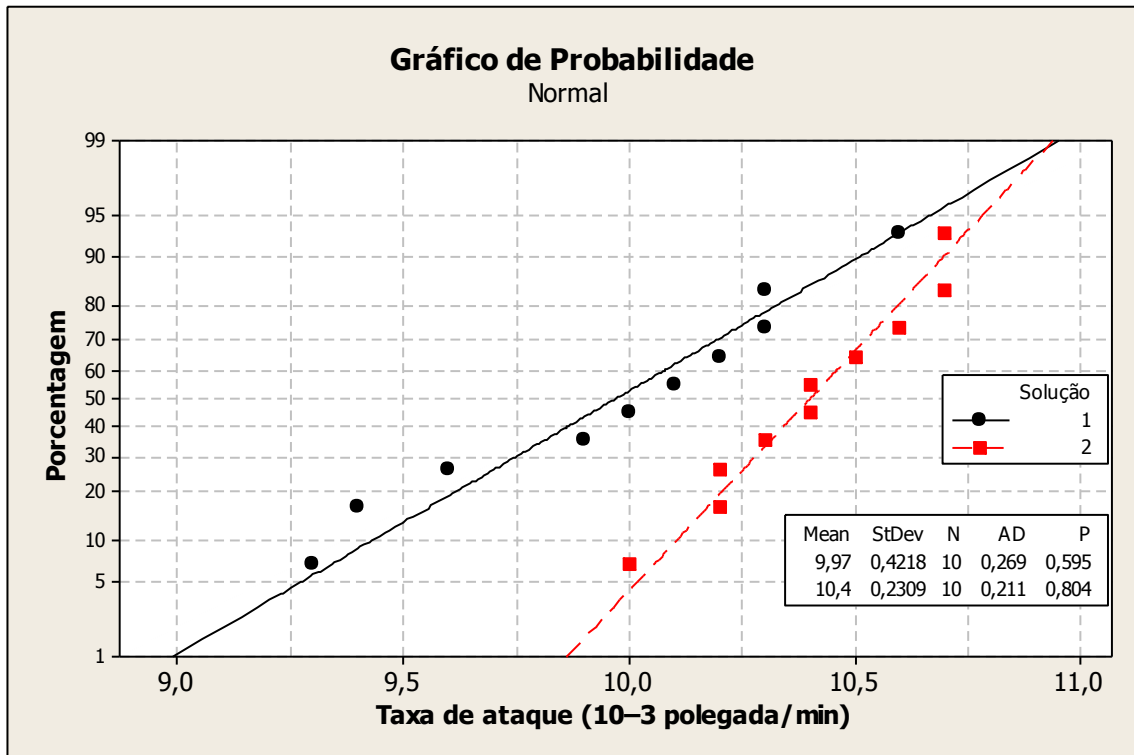
2-Sample t Test

Testing mean 1 = mean 2 (versus <)
 Calculating power for mean 1 = mean 2 + difference
 Alpha = 0,05 Assumed standard deviation = 9,9723

Difference	Sample Size	Target Power	Actual Power
-5	69	0,9	0,900681

The sample size is for each group.

Exercício 5-17



Test and CI for Two Variances: Taxa de ataque vs Solução

Method

Null hypothesis Variance(1) / Variance(2) = 1
 Alternative hypothesis Variance(1) / Variance(2) not = 1
 Significance level Alpha = 0,05

Statistics

Solução	N	StDev	Variance
1	10	0,422	0,178
2	10	0,231	0,053

Ratio of standard deviations = 1,826
 Ratio of variances = 3,335

95% Confidence Intervals

Distribution	CI for StDev	CI for Variance
--------------	--------------	-----------------

of Data	Ratio	Ratio
Normal	(0,910; 3,664)	(0,828; 13,428)
Continuous	(0,818; 3,982)	(0,670; 15,854)

Tests

Method	DF1	DF2	Test	
			Statistic	P-Value
F Test (normal)	9	9	3,34	0,087
Levene's Test (any continuous)	1	18	2,77	0,114

Two-Sample T-Test and CI: Taxa de ataque; Solução

Two-sample T for Taxa de ataque

Solução	N	Mean	StDev	SE Mean
1	10	9,970	0,422	0,13
2	10	10,400	0,231	0,073

Difference = mu (1) - mu (2)
 Estimate for difference: -0,430
 95% CI for difference: (-0,749; -0,111)
 T-Test of difference = 0 (vs not =): T-Value = -2,83 P-Value = 0,011 DF = 18
 Both use Pooled StDev = 0,3400

Exercício 5-22

Two-Sample T-Test and CI

Sample	N	Mean	StDev	SE Mean
1	25	20,12	1,90	0,38
2	25	11,64	7,90	1,6

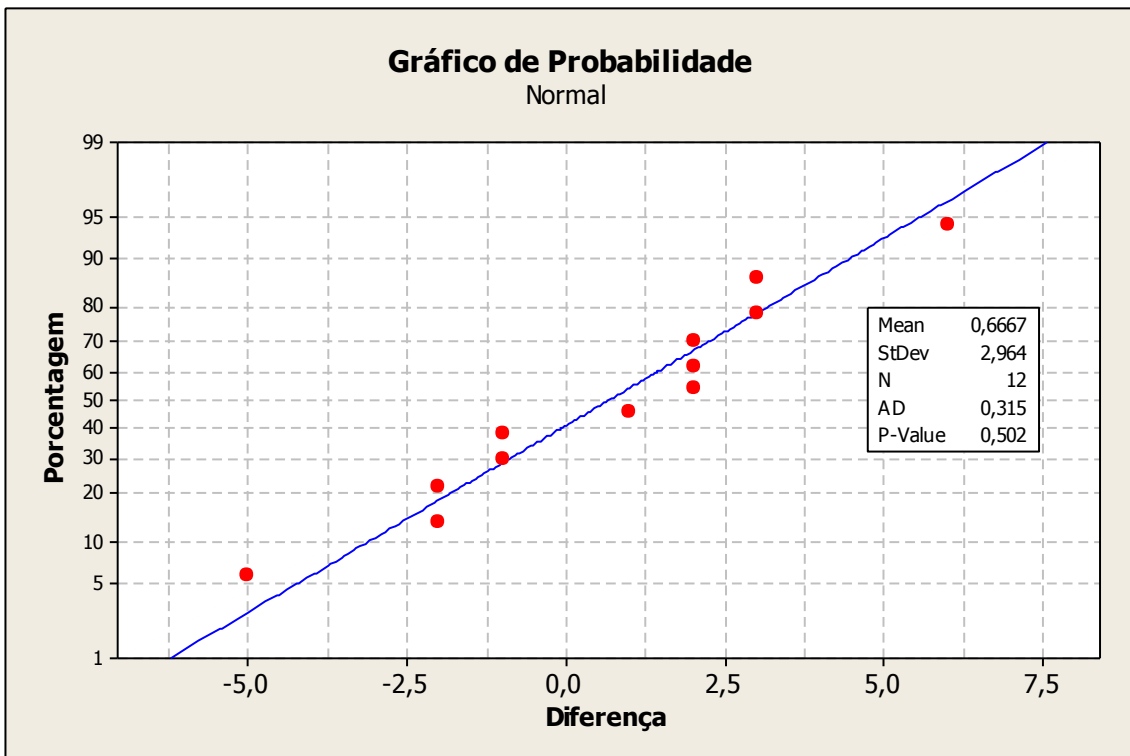
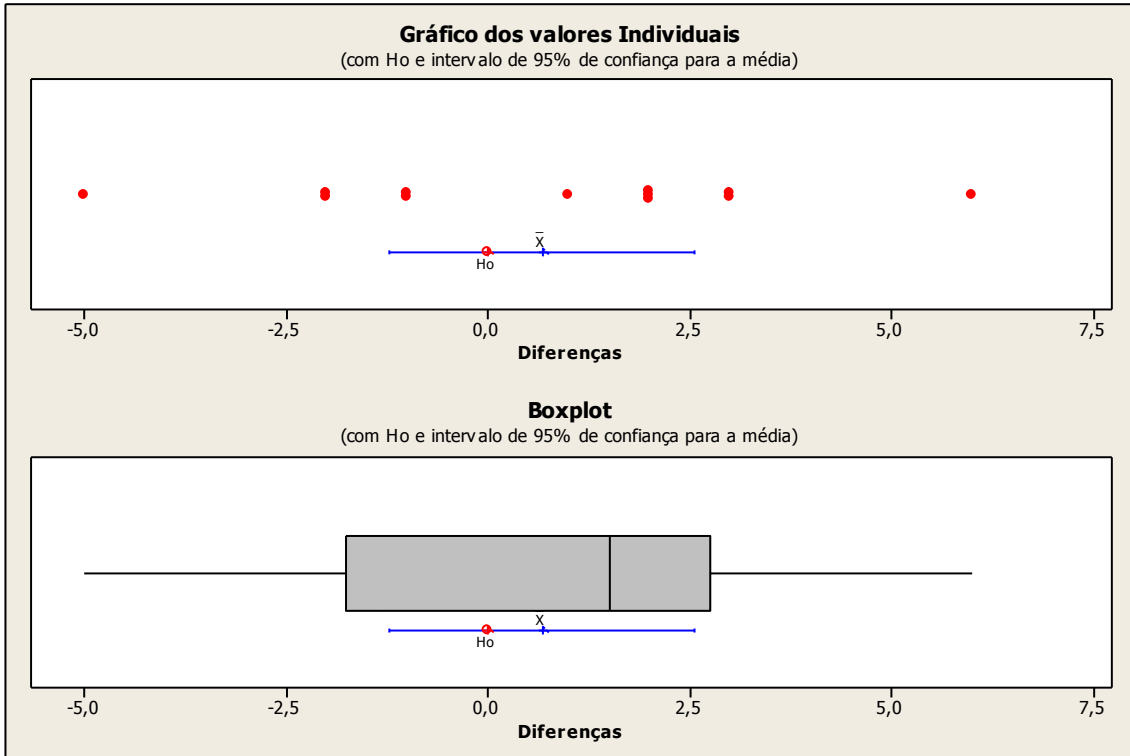
Difference = mu (1) - mu (2)
 Estimate for difference: 8,48
 95% CI for difference: (5,14; 11,82)
 T-Test of difference = 0 (vs not =): T-Value = 5,22 P-Value = 0,000 DF = 26

Two-Sample T-Test and CI

Sample	N	Mean	StDev	SE Mean
1	25	20,12	1,90	0,38
2	25	11,64	7,90	1,6

Difference = mu (1) - mu (2)
 Estimate for difference: 8,48
 95% lower bound for difference: 5,71

Exercício 5-31



Paired T-Test and CI: Linguagem 1; Linguagem 2

Paired T for Linguagem 1 - Linguagem 2

	N	Mean	StDev	SE Mean
Linguagem 1	12	17,92	3,63	1,05

Linguagem	2	12	17,25	4,59	1,33
Difference		12	0,667	2,964	0,856

95% CI for mean difference: (-1,217; 2,550)

T-Test of mean difference = 0 (vs not = 0): T-Value = 0,78 P-Value = 0,452

Exercício 5-32

Paired T-Test and CI: Antes; Depois

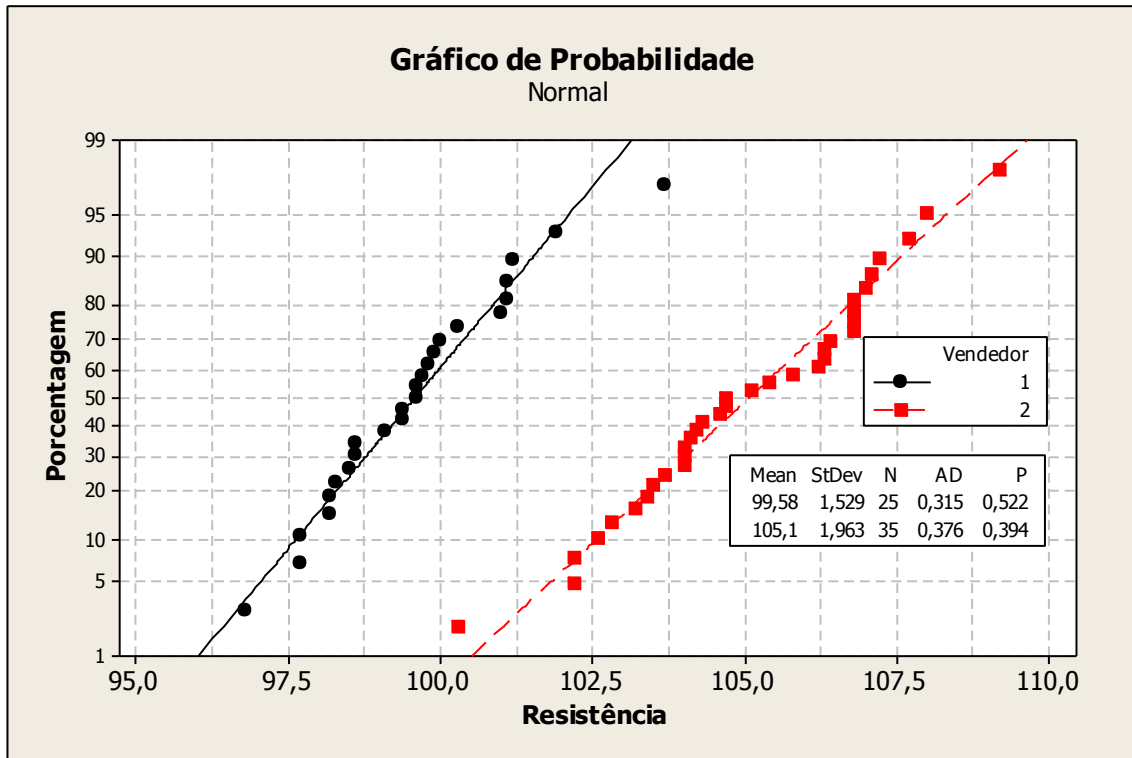
Paired T for Antes - Depois

	N	Mean	StDev	SE Mean
Antes	15	261,80	24,96	6,45
Depois	15	234,93	10,48	2,71
Difference	15	26,87	19,04	4,92

95% CI for mean difference: (16,32; 37,41)

T-Test of mean difference = 0 (vs not = 0): T-Value = 5,47 P-Value = 0,000

Exercício 5-67:



Test and CI for Two Variances: Resistência vs Vendedor

Method

Null hypothesis Variance(1) / Variance(2) = 1
 Alternative hypothesis Variance(1) / Variance(2) not = 1
 Significance level Alpha = 0,05

Statistics

Vendedor	N	StDev	Variance
1	25	1,529	2,338
2	35	1,963	3,852

Ratio of standard deviations = 0,779
 Ratio of variances = 0,607

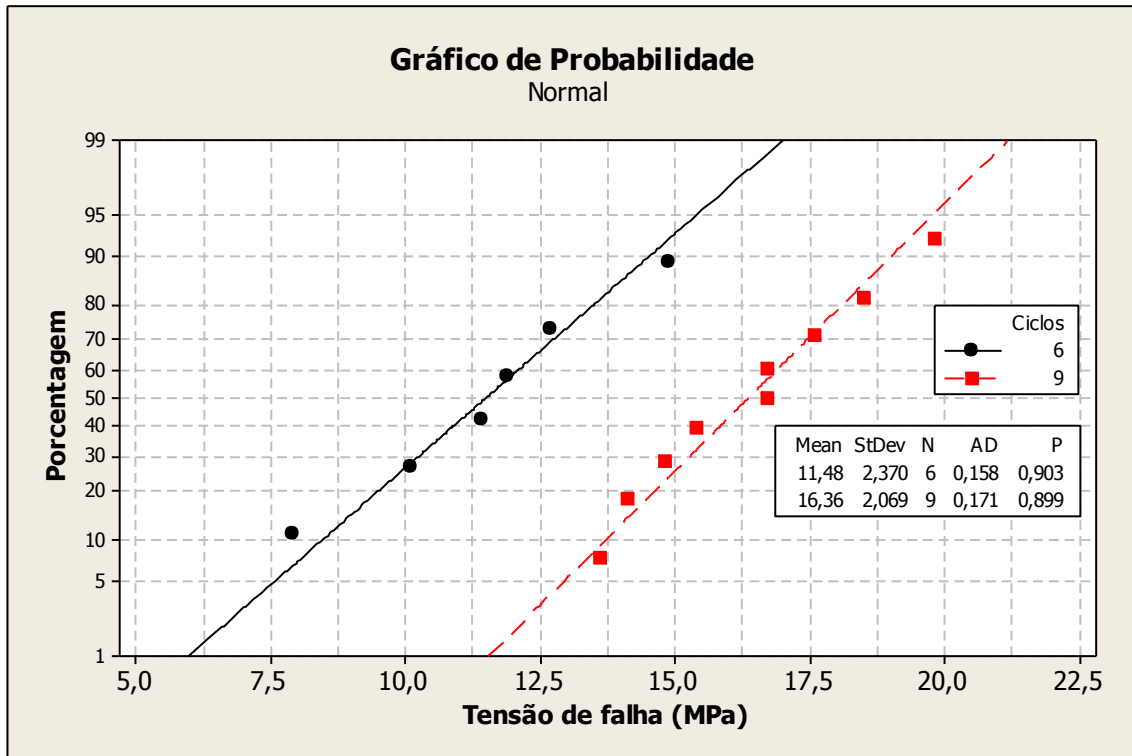
95% Confidence Intervals

Distribution of Data	CI for StDev Ratio	CI for Variance Ratio
Normal	(0,541; 1,150)	(0,293; 1,323)
Continuous	(0,467; 1,061)	(0,218; 1,126)

Tests

Method	DF1	DF2	Test Statistic	P-Value
F Test (normal)	24	34	0,61	0,205
Levene's Test (any continuous)	1	58	2,97	0,090

Exercícios 5-68 e 5-69:



Test and CI for Two Variances: Tensão de falha vs Ciclos

Method

Null hypothesis Variance(6) / Variance(9) = 1
 Alternative hypothesis Variance(6) / Variance(9) not = 1
 Significance level Alpha = 0,05

Statistics

Ciclos	N	StDev	Variance
6	6	2,370	5,618
9	9	2,069	4,283

Ratio of standard deviations = 1,145
 Ratio of variances = 1,312

95% Confidence Intervals

Distribution of Data	CI for StDev Ratio	CI for Variance Ratio
Normal	(0,522; 2,977)	(0,272; 8,863)
Continuous	(0,344; 3,229)	(0,119; 10,426)

Tests

Method	DF1	DF2	Test Statistic	P-Value
F Test (normal)	5	8	1,31	0,697
Levene's Test (any continuous)	1	13	0,01	0,944

Two-Sample T-Test and CI: Tensão de falha; Ciclos

Two-sample T for Tensão de falha

Ciclos	N	Mean	StDev	SE Mean
6	6	11,48	2,37	0,97
9	9	16,36	2,07	0,69

Difference = mu (6) - mu (9)

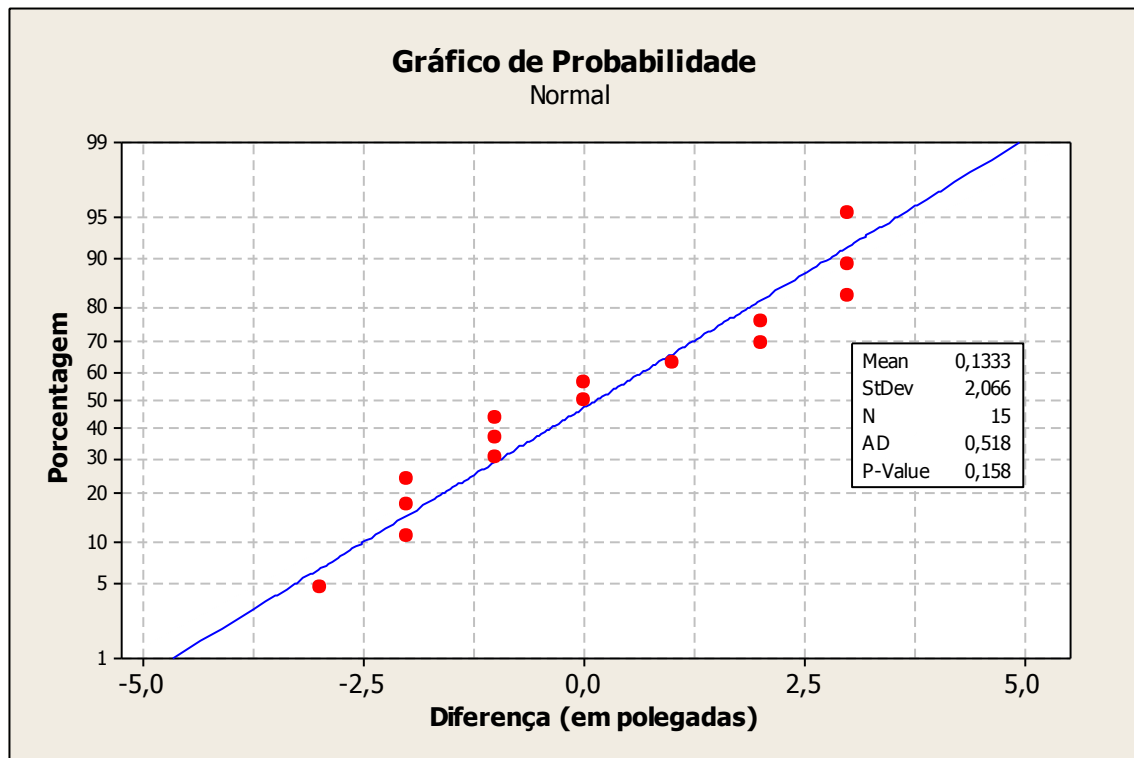
Estimate for difference: -4,87

99% CI for difference: (-8,35; -1,40)

T-Test of difference = 0 (vs not =): T-Value = -4,22 P-Value = 0,001 DF = 13

Both use Pooled StDev = 2,1900

Exercício 5-85



Paired T-Test and CI: Medidor 1; Medidor 2

Paired T for Medidor 1 - Medidor 2

	N	Mean	StDev	SE Mean
Medidor 1	15	49,200	3,144	0,812
Medidor 2	15	49,067	3,411	0,881
Difference	15	0,133	2,066	0,533

95% CI for mean difference: (-1,011; 1,277)

T-Test of mean difference = 0 (vs not = 0): T-Value = 0,25 P-Value = 0,806

Power and Sample Size

Paired t Test

Testing mean paired difference = 0 (versus not = 0)

Calculating power for mean paired difference = difference

Alpha = 0,01 Assumed standard deviation of paired differences = 2,066

Difference	Sample Size	Target Power	Actual Power
1,65	22	0,8	0,807867