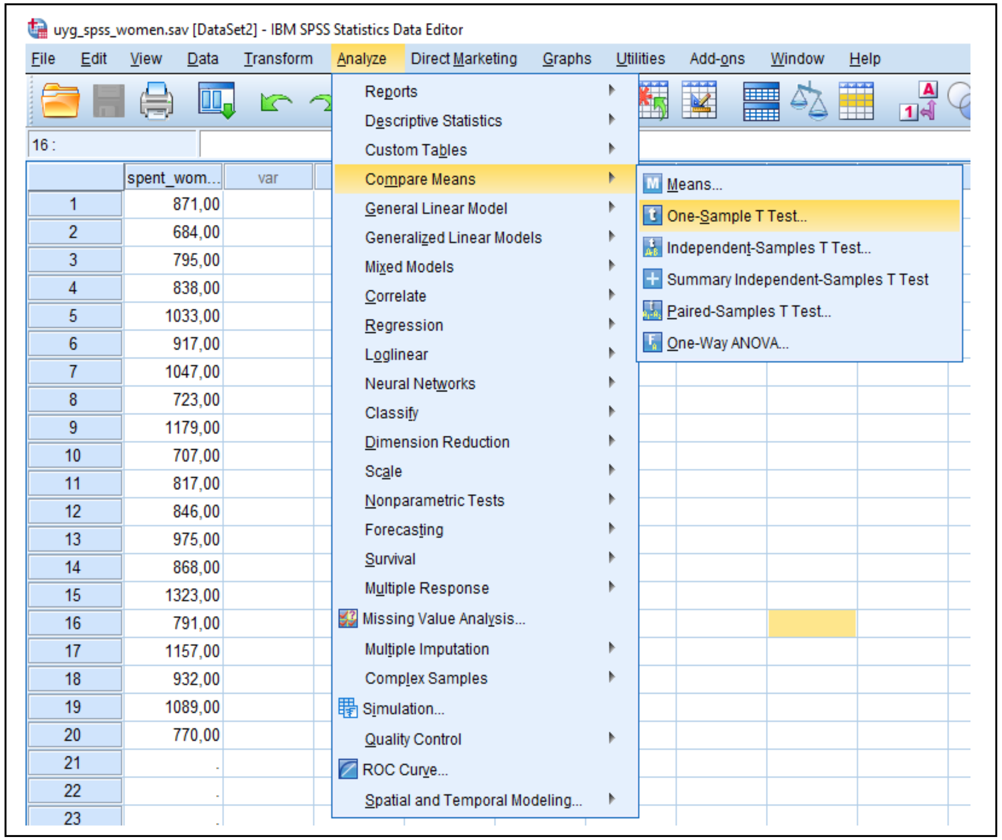
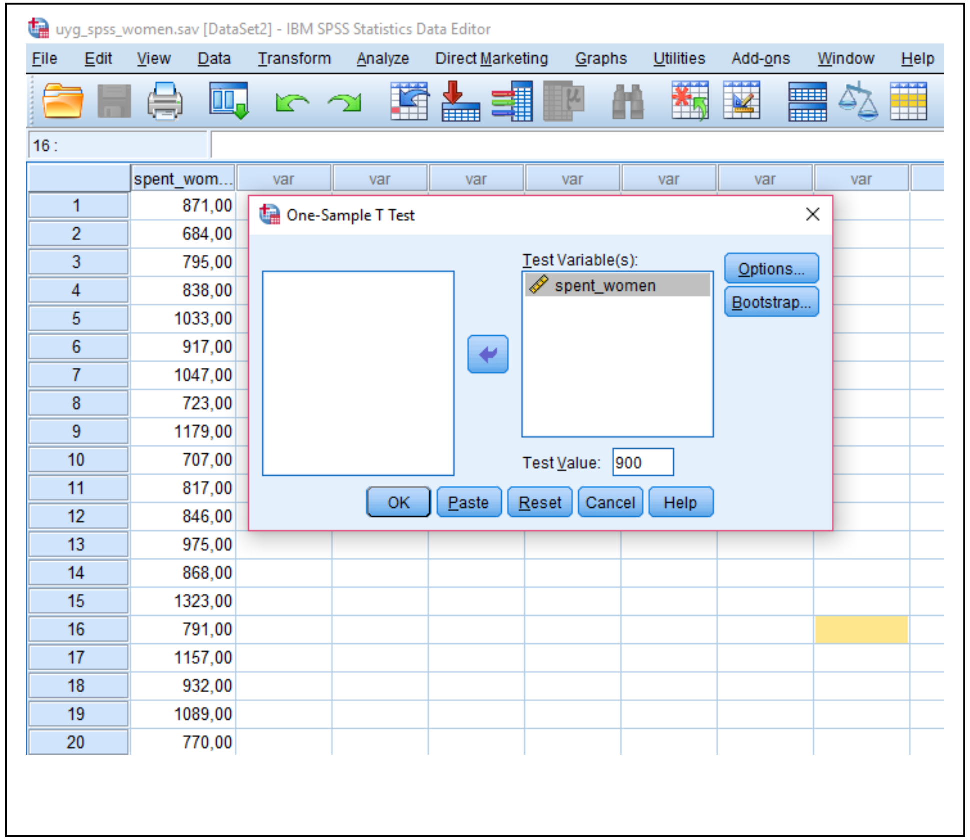
Example 1: Folowing table shows the amount of money paid by women for reparing of their cars. Conduct a test of hypothesis whether if the mean of spent money by women for reparing of their cars equals to 900 or not using α=0.05.

women	871	684	795	838	1033	917	1047	723	1179	707	817	846	975	868	1323	791	1157	932	1089	770





One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
spent_women	20	918,1000	173,01929	38,68829

One-Sample Test

	Test Value = 900					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
spent_women	,468	19	,645	18,10000	-62,8755	99,0755

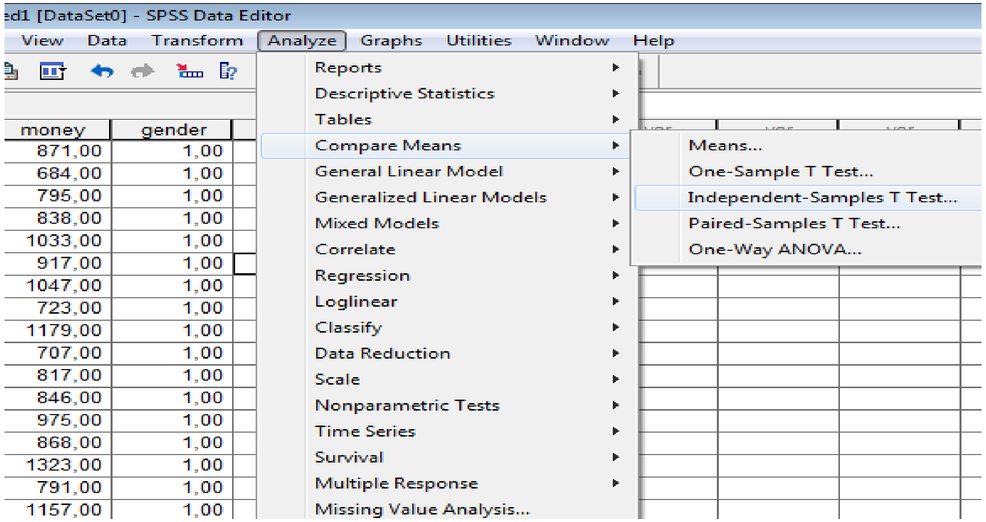
H_0: $\mu = 900$
H_1: $\mu \neq 900$

σ^2 is not known and n<30 so for the test, test statistic is $t = \dfrac{\bar{X} - 900}{S/\sqrt{n}} = 0.468$ and critical value using t distribution with 19 degrees of freedom, $t_{0.025,19} = 2.093$. When comparing the test value and critical value at level 0.05, $0.468 < 2.093$ is found and we say that H_0 cannot be rejected. In addition this decision can be taken by using the p value(sig. (2 tailed)) given in the table. Since $p\,value = 0.645 > \alpha = 0.05$, H_0 cannot be rejected at the significance of level α=0.05.

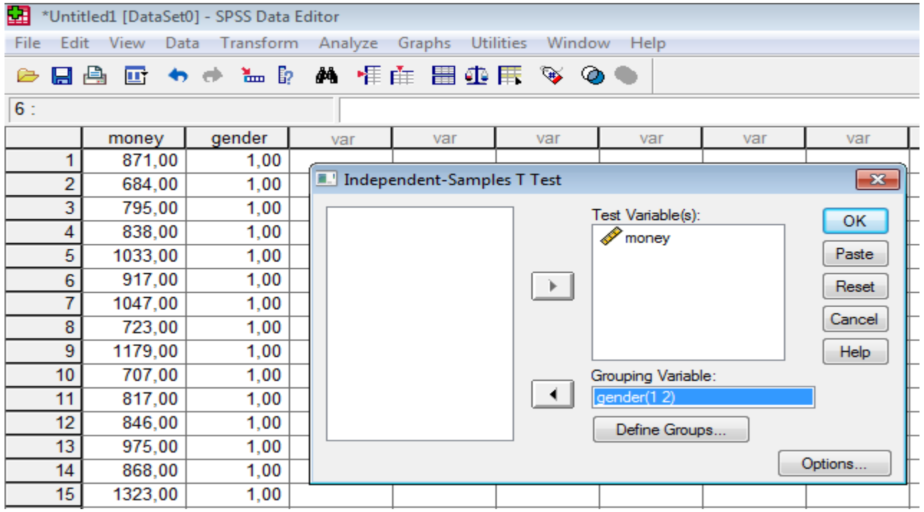
Example 2: Folowing table shows the amount of money paid by women and men for reparing of their cars. Conduct a test of hypothesis comparing the two means of spent money for women and men's car repairs using α=0.05.

women	871	684	795	838	1033	917	1047	723	1179	707	817	846	975	868	1323	791	1157	932	1089	770
men	792	765	511	520	618	447	548	720	899	788	927	657	851	702	918	528	884	702	839	878

1. Step



2. step



1) H₀: $\mu_1 - \mu_2 = 0$

   H₁: $\mu_1 - \mu_2 \neq 0$

For the these hypotheses test we need to decide whether $\sigma_1^2 = \sigma_2^2$ or not.

2) H₀: $\sigma_1^2 = \sigma_2^2$

   H₁: $\sigma_1^2 \neq \sigma_2^2$

From the output

$f=\frac{S_1^2}{S_2^2}=1.2686$ critical value by using f distribution $f_{0.025,(df1=19,df2=19)}=2.53$ and comparing the test value and critical value at level 0.05, $1.2686<2.53$ is found and we say that H_0 cannot be rejected at the significance of level α=0.05.

NOTE: Moreover, we can also test the hypothesis given in 2) by using "Levene's Test for Equality of Variances" at the table entitled "Independence Samples Test". For the Levene's Test the significance value $p=0.732>\alpha=0.05$ as a result H_0: $\sigma_1^2=\sigma_2^2$ hypothesis cannot be rejected at the significance of level α=0.05.

For the hypothesis given 1) we use first line of the table entitled "Independence Samples Test". Here t test statistic's value $t=3.738$ and $p=0.001<0.05$ H_0 is rejected at the significance of level α=0.05. We can say that the amount of money paid by women and men for reparing of their cars are not same. Women pay more money then men for reparing the their car.

Group Statistics

	gender	N	Mean	Std. Deviation	Std. Error Mean
money	women	20	918,1000	173,01929	38,68829
	men	20	724,7000	153,61370	34,34907

Independent Samples Test

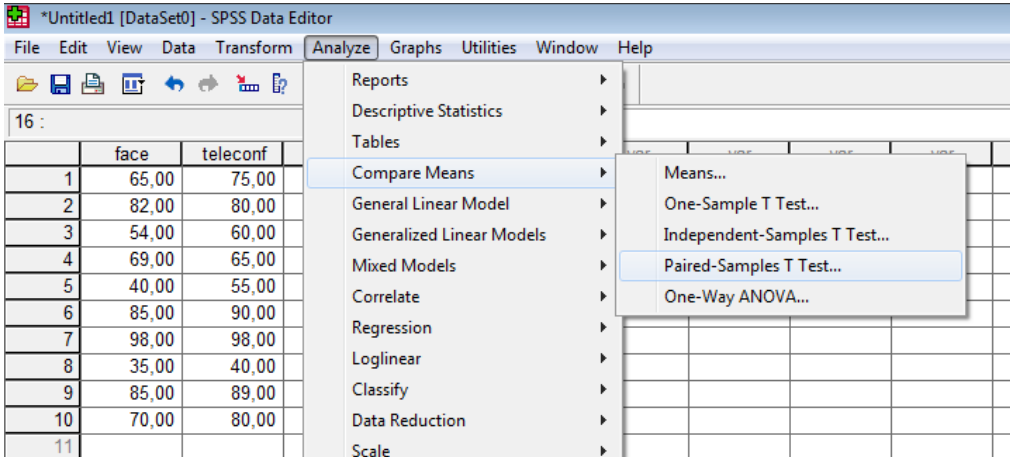
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
money	Equal variances assumed	,119	,732	3,738	38	,001	193,40000	51,73627	88,66539	298,13461
	Equal variances not assumed			3,738	37,475	,001	193,40000	51,73627	88,61715	298,18285

Example 3: In the research of a psychology department, to compare two methods of solving problem in group, two problems sets 10 groups of each having 4 persons: one was solved by using face to face method; other was solved by using teleconference method. Groups' scores were recorded.

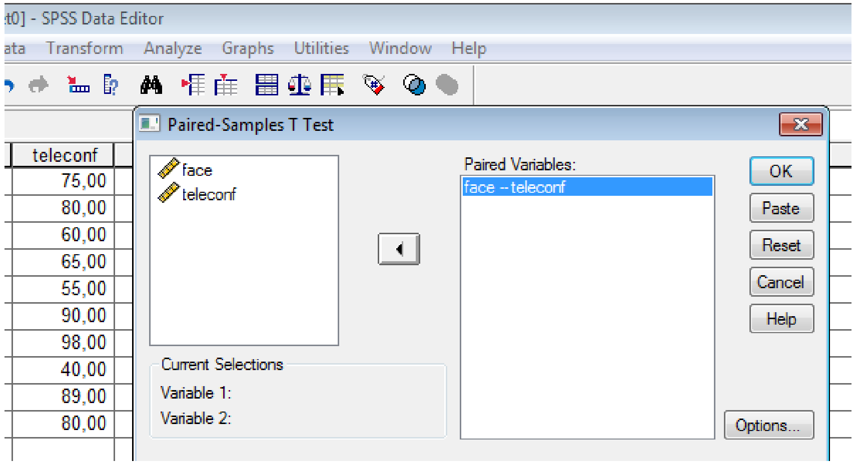
a) Conduct a test of hypothesis comparing the two methods efficiencies using α=0.05.
b) Use a 95 % confidence interval to estimate the difference between the mean of test scores for two methods.
c) Compare parts a) and b).

Face to face	65	82	54	69	40	85	98	35	85	70
teleconference	75	80	60	65	55	90	98	40	89	80

1. Step



2. step



H0: $\mu_1 - \mu_2 = 0$

H1: $\mu_1 - \mu_2 \neq 0$

The samples are dependent since two problem sets were asked same 10 groups of each having 4 persons.

σ_D^2 is not known and n<30 so for the test, test statistic is $t = \dfrac{\bar{d} - 0}{S_d / \sqrt{n}} = -2.653$ and critical value using t distribution with 9 degrees of freedom, $t_{0.025,9} = 2.262$. When comparing the test value and critical value at level 0.05, $|-2.653| \geq 2.262$ is found and we say that H_0 is rejected. In addition this decision can be taken by using the p value(sig. (2 tailed)) given in the table. Since $p\,value = 0.026 < \alpha = 0.05$ H_0 is rejected at the significance of level α=0.05.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	face	68,3000	10	20,42901	6,46022
	teleconf	73,2000	10	18,00494	5,69366

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper			
Pair 1	face - teleconf	-4,90000	5,83952	1,84662	-9,07734	-,72266	-2,653	9	,026

NOTE: Since there is no test using z statistic in SPSS, these tests related to z statistic are also done with respect to t statistic. Because the distribution of t statistic approximates to standard normal distribution for large sample sizes.

NOTE: In all of these examples alternative hypotheses are two sided tests since the p-value (Sig.2-tailed) are given in the tables. So that we directly compare the p values with significance level α. However, if we are conducting one-sided test, taking half of the p-value (p-value /2) is compared with significance level α and the decision about the null hypothesis H_0 is taken.