

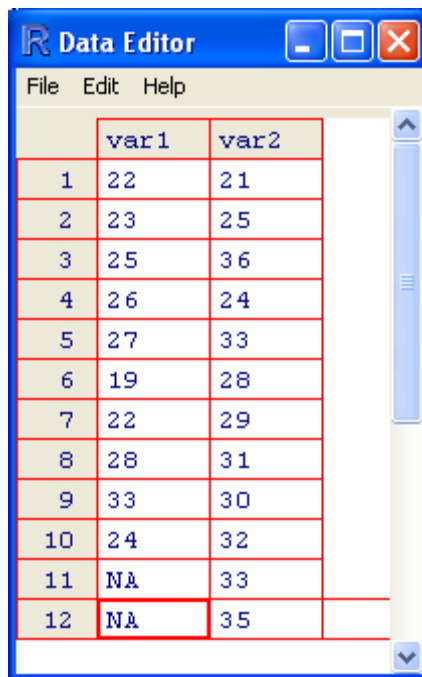
## Two Independent Sample t-Test

**Example:** The following data is results from measuring the body mass index from two independent random samples from two populations.

Sample 1: 22, 23, 25, 26, 27, 19, 22, 28, 33, 24

Sample 2: 21, 25, 36, 24, 33, 28, 29, 31, 30, 32, 33, 35

- 1.) Use R to determine if **normality assumption** is correct. Start by arranging data into two columns as shown below.



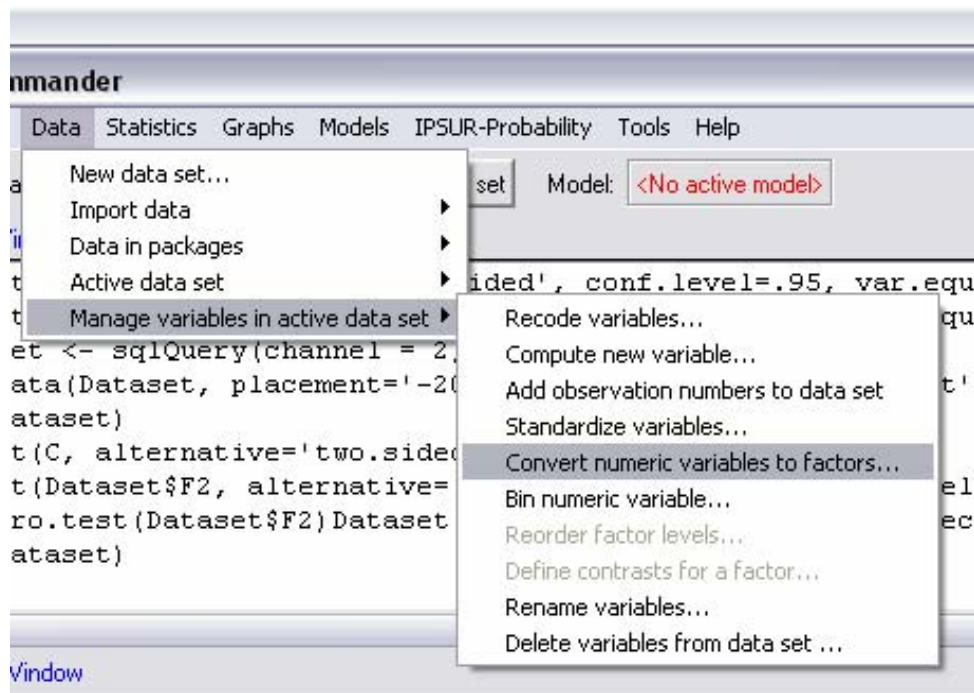
	var1	var2
1	22	21
2	23	25
3	25	36
4	26	24
5	27	33
6	19	28
7	22	29
8	28	31
9	33	30
10	24	32
11	NA	33
12	NA	35

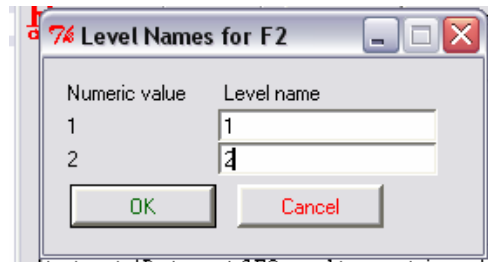
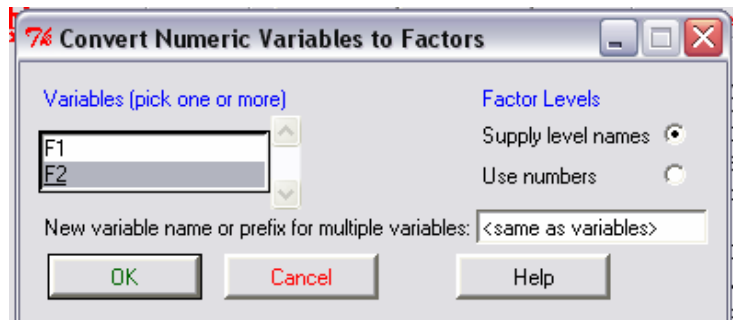
- 2.) Perform `shapiro.test()` for each variable to determine if  $p$ -value is greater than .05; thus determining if the normality assumption is acceptable for both samples.

- 3.) Next, data must be arranged in a single column with 1 or 2 placed in the column next to it denote which set the value is from (See Below).

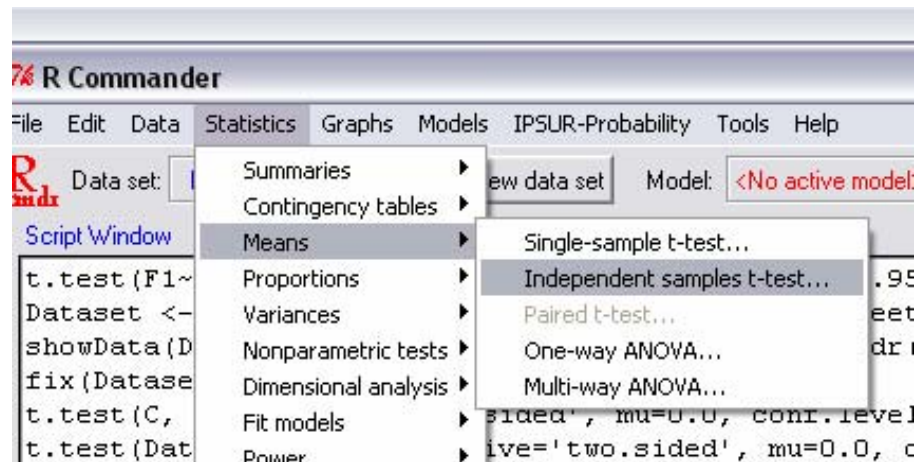
	F1	F2	var3	var4	var5	var6	var7
1	23	1					
2	25	1					
3	26	1					
4	27	1					
5	19	1					
6	22	1					
7	28	1					
8	33	1					
9	24	1					
10	21	2					
11	25	2					
12	36	2					
13	24	2					
14	33	2					
15	28	2					
16	29	2					
17	31	2					
18	30	2					
19	32	2					
20	33	2					
21	35	2					

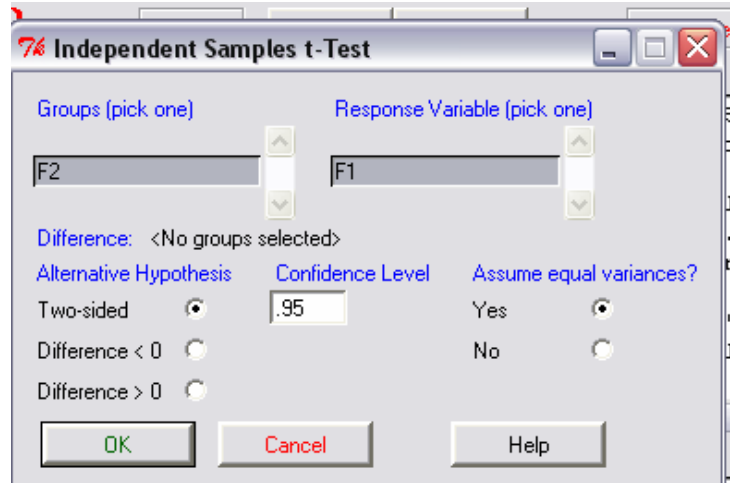
- 4.) Convert F1 into factor variables by clicking on Data, Manage variables in active data set, and Convert numeric variables to factors.





- 5.) Perform test of equality of variances and check p-value (p-value = 0.6421, not shown in this instruction) to determine if equal variances assumption is acceptable. If p-value is greater than 0.05, the equal variances assumption would be acceptable at 5% level of significance.
- 6.) Click Statistics, Means, Independent sample t-test to perform two independent samples t-test with Assume equal variances Yes bullet checked.





R Output:

```
Two Sample t-test
```

```
data: var1 by var2
t = -2.6437, df = 20, p-value = 0.01558
alternative hypothesis: true difference in means is not equal to
0
95 percent confidence interval:
-8.676786 -1.023214
sample estimates:
mean in group 1 mean in group 2
24.90 29.75
```

Interpretation: Since  $p\text{-value} = 0.01558$  for the test is less than 0.05. One can conclude that the null hypothesis is rejected. There is sufficient evidence to support the alternative hypothesis that the average between the two populations is statistically significantly different.