

/*-----*/
/* 6장 실습문제 */
/*-----*/

```
data Ex6_1;  
input x @@;  
cards;  
6.4 4.3 5.7 4.9 6.5 6.4 5.1 5.9  
;  
proc ttest data=Ex6_1 h0=5 sides=u;  
var x;  
run; /* H1 */
```

SAS 시스템					
The TTEST Procedure					
Variable: x					
N	Mean	Std Dev	Std Err	Minimum	Maximum
8	5.6500	0.8106	0.2866	4.3000	6.5000
Mean	95% CL Mean	Std Dev	95% CL Std Dev		
5.6500	5.1070	Infy	0.8106	0.5360	1.6499
DF	t Value	Pr > t			
7	2.27	0.0288			

/*-----*/

```
data Ex6_2;  
input weight @@ ;  
cards;  
8.3 9.5 9.6 8.1 7.3 8.0 7.7 8.2  
;  
proc ttest data=Ex6_2 h0=8.5 sides=l;  
var weight;  
run; /* H0 */
```

SAS 시스템					
The TTEST Procedure					
Variable: weight					
N	Mean	Std Dev	Std Err	Minimum	Maximum
8	8.3375	0.8123	0.2872	7.3000	9.6000
Mean	95% CL Mean	Std Dev	95% CL Std Dev		
8.3375	-Infy	8.8816	0.8123	0.5371	1.6532
DF	t Value	Pr < t			
7	-0.57	0.2946			

/*-----*/

```
data Ex6_3;  
input time @@;  
cards;  
159 280 101 121 224 222 379 179 250 170  
;  
proc ttest data=Ex6_3 h0=225;  
var time;  
run; /* H0 */
```

SAS 시스템					
The TTEST Procedure					
Variable: time					
N	Mean	Std Dev	Std Err	Minimum	Maximum
10	208.5	81.8824	25.8935	101.0	379.0
Mean	95% CL Mean	Std Dev	95% CL Std Dev		
208.5	149.9	267.1	81.8824	56.3216	149.5
DF	t Value	Pr > t			
9	-0.64	0.5398			

/*-----*/

```
data Ex6_4;  
input group $ x @@;  
cards;  
A 22 B 27 A 25 B 40 A 30 B 18  
A 27 B 55 A 21 B 11 A 29 B 65 B 72  
;  
proc ttest data=Ex6_4;  
class group;  
var x;  
run; /* H0 */
```

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	11	-1.58	0.1433
Satterthwaite	Unequal	6.3355	-1.71	0.1361

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	6	5	41.57	0.0008

/*-----*/

```
data Ex6_5;
input old new @@;
cards;
52 45 48 72 87 85 57 63 60
71 42 48 48 56 94 92 78 80
;
proc ttest data=Ex6_5;
    paired old*new;
run; /* H0 */

/*-----*/
```

N	Mean	Std Dev	Std Err	Minimum	Maximum
9	-5.1111	9.0753	3.0251	-24.0000	7.0000

Mean	95% CL Mean	Std Dev	95% CL Std Dev
-5.1111	-12.0870 1.8648	9.0753	6.1300 17.3862

DF	t Value	Pr > t
8	-1.69	0.1296

```
data Ex6_6;
input medi $ prefer @@;
cards;
TV 16 TV 19 TV 25 TV 22 TV 21 TV 15
TV 16 TV 22 TV 21 TV 18
신문 13 신문 14 신문 15 신문 16 신문 15
신문 13 신문 19 신문 16 신문 20 신문 14
신문 11 라디오 18 라디오 18 라디오 15 라디오
14 라디오 14 라디오 10 라디오 18 라디오 15 라디오 15
잡지 11 잡지 15 잡지 11 잡지 17 잡지 17
잡지 13 잡지 14 잡지 16 잡지 13 잡지 11
;
proc anova data=Ex6_6;
    class medi;
    model prefer=medi;
    means medi/tukey duncan;
run; /* H1 */

/*-----*/
```

Source	DF	Anova SS	Mean Square	F Value	Pr > F
medi	3	185.0353535	61.6784512	8.27	0.0003

Means with the same letter are not significantly different.			
Duncan Grouping	Mean	N	medi
A	19.500	10	TV
B	15.222	9	라디오
B			
B	15.091	11	신문
B			
B	13.800	10	잡지

Means with the same letter are not significantly different.			
Tukey Grouping	Mean	N	medi
A	19.500	10	TV
B	15.222	9	라디오
B			
B	15.091	11	신문
B			
B	13.800	10	잡지

```
data Ex6_7;
input fabric $ minute @@;
cards;
A 17.8 A 16.2 A 17.5 A 17.4 A 15.0
B 11.2 B 11.4 B 15.8 B 10.0 B 10.4
C 11.8 C 11.0 C 10.0 C 9.2 C 9.2
D 14.9 D 10.8 D 12.8 D 10.7 D 10.7
;
proc anova data=Ex6_7;
    class fabric;
    model minute=fabric;
    means fabric/tukey duncan;
run; /* H1 */

/*-----*/
```

Source	DF	Anova SS	Mean Square	F Value	Pr > F
fabric	3	120.4980000	40.1660000	13.89	0.0001

Means with the same letter are not significantly different.			
Tukey Grouping	Mean	N	fabric
A	16.780	5	A
B	11.980	5	D
B			
B	11.760	5	B
B			
B	10.240	5	C

```
data Ex6_8;
do fertil='A1', 'A2', 'A3' ;
  do yield='B1', 'B2', 'B3' ;
    input quality @@;
    output;
  end;
end;
cards;
49 79 64
57 70 74
11 46 46
;
proc anova data=Ex6_8;
  class fertil yield;
  model quality= fertil yield;
  means fertil / tukey;
  means yield / tukey;
run;
```

Source	DF	Anova SS	Mean Square	F Value	Pr > F
fertil	2	1956.222222	978.111111	16.55	0.0116
yield	2	1188.222222	594.111111	10.05	0.0275