

Sas 506 project

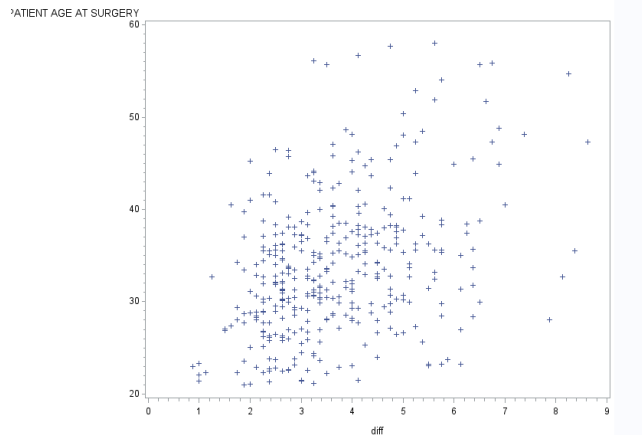
Thursday, November 30, 2017 7:31 PM

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
YR1REF	REFRACTION AT 1 YR	386	-0.2992228	1.2170352	-4.2500000	3.6250000
AGE	PATIENT AGE AT SURGERY	386	33.7781703	7.4388639	21.0020534	58.0095825
IOP	OCULAR PRESSURE	386	14.4317789	3.1356228	7.0000000	25.0000000

The SAS System				
The FREQ Procedure				
good	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	135	34.97	135	34.97
1	251	65.03	386	100.00

1-0.3497

Age and change



If AGE divided into 2 groups then

☐ Ttest:

When the p-value (shown under "Pr>F") is greater than 0.05, then the variances are equal then read the "Pooled" section of the result

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	154	230	1.22	0.1778

equal variances

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	-6.00	<.0001
Satterthwaite	Unequal	307.98	-5.89	<.0001

p<0.0001

reject the null hypothesis difference in two groups

If AGE divided into 4 groups then

☐ Anova:

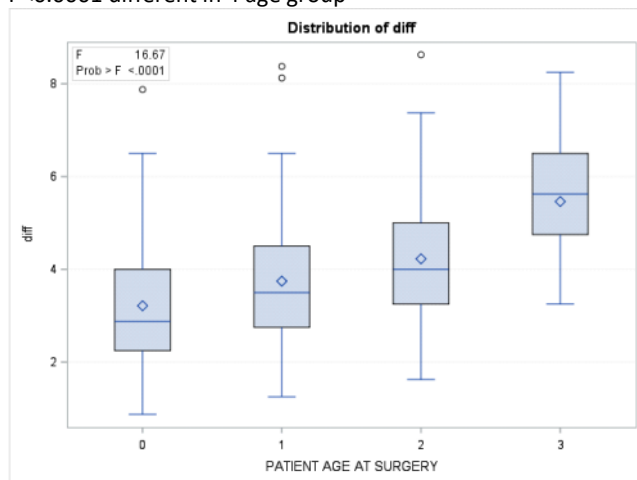
The ANOVA Procedure					
Levene's Test for Homogeneity of diff Variance ANOVA of Squared Deviations from Group Means					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
AGE	3	23.7887	7.9296	1.07	0.3623
Error	382	2834.9	7.4212		

Welch's ANOVA for diff			
Source	DF	F Value	Pr > F
AGE	3.0000	14.38	<.0001
Error	50.5378		

0.3623>0.05 equal variance in two age group
<0.0001 and

Source	DF	Anova SS	Mean Square	F Value	Pr > F
AGE	3	85.12281082	28.37427027	16.67	<.0001

P<0.0001 different in 4 age group



Level of AGE	N	diff	
		Mean	Std Dev
0	126	3.21428571	1.32635376
1	194	3.74422680	1.22364800
2	53	4.22641509	1.50780354
3	13	5.46153846	1.39323572

SEX

Ttest

SEX	N	Mean	Std Dev	Std Err	Minimum	Maximum
1	205	3.8689	1.4954	0.1044	1.0000	8.3750
2	181	3.4986	1.2160	0.0904	0.8750	8.6250
Diff (1-2)		0.3703	1.3715	0.1399		

SEX	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
1		3.8689	3.6630 4.0748	1.4954	1.3633 1.6560
2		3.4986	3.3203 3.6770	1.2160	1.1023 1.3561
Diff (1-2)	Pooled	0.3703	0.0952 0.6453	1.3715	1.2810 1.4759
Diff (1-2)	Satterthwaite	0.3703	0.0987 0.6418		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	2.65	0.0085
Satterthwaite	Unequal	381.48	2.68	0.0077

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	204	180	1.51	0.0046

Different

HXSFTCON:

HXSFTCON	N	Mean	Std Dev	Std Err	Minimum	Maximum
1	261	3.8702	1.4054	0.0870	0.8750	8.6250
2	125	3.3300	1.2615	0.1128	1.0000	7.8750
Diff (1-2)		0.5402	1.3606	0.1480		

HXSFTCON	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
1		3.8702	3.6989 4.0415	1.4054	1.2943 1.5375
2		3.3300	3.1067 3.5533	1.2615	1.1221 1.4407
Diff (1-2)	Pooled	0.5402	0.2493 0.8312	1.3606	1.2708 1.4641
Diff (1-2)	Satterthwaite	0.5402	0.2597 0.8207		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	3.65	0.0003
Satterthwaite	Unequal	269.77	3.79	0.0002

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	260	124	1.24	0.1735

IOP:

Ttest divide by 15

The SAS System							
The TTEST Procedure							
Variable: diff							
IOP	N	Mean	Std Dev	Std Err	Minimum	Maximum	
0	231	3.5476	1.3171	0.0867	1.0000	8.6250	
1	155	3.9154	1.4504	0.1165	0.8750	8.3750	
Diff (1-2)		-0.3677	1.3721	0.1425			

IOP	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
0		3.5476	3.3769 3.7184	1.3171	1.2070 1.4496
1		3.9154	3.6852 4.1455	1.4504	1.3049 1.6327
Diff (1-2)	Pooled	-0.3677	-0.6479 -0.0876	1.3721	1.2816 1.4766
Diff (1-2)	Satterthwaite	-0.3677	-0.6534 -0.0820		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	-2.58	0.0102
Satterthwaite	Unequal	308.36	-2.53	0.0118

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	154	230	1.21	0.1853

ANOVA

if IOP le 13 then IOP=1;

else if IOP le 19 then IOP=2;

else IOP=3;

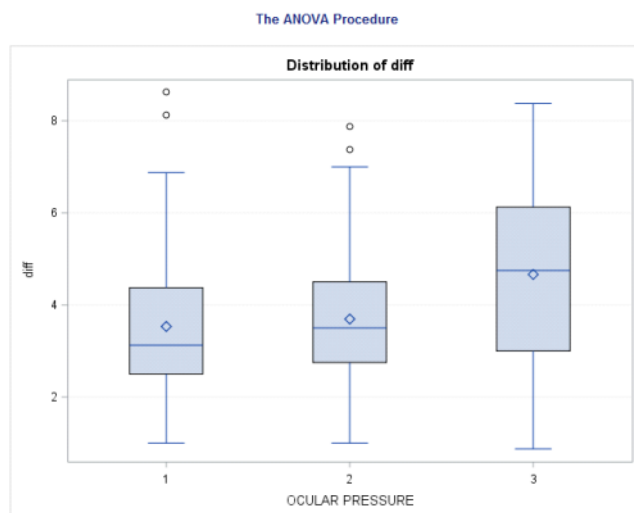
The SAS System					
The ANOVA Procedure					
Dependent Variable: diff					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	25.0860959	12.5430479	6.76	0.0013
Error	383	710.4339728	1.8549190		
Corrected Total	385	735.5200687			

R-Square	Coeff Var	Root MSE	diff Mean
0.034107	36.85654	1.361954	3.695285

Source	DF	Anova SS	Mean Square	F Value	Pr > F
IOP	2	25.08609587	12.54304794	6.76	0.0013

The SAS System					
The ANOVA Procedure					
Levene's Test for Homogeneity of diff Variance ANOVA of Squared Deviations from Group Means					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
IOP	2	118.4	59.2162	7.13	0.0009
Error	383	3181.8	8.3075		

Welch's ANOVA for diff			
Source	DF	F Value	Pr > F
IOP	2.0000	3.43	0.0392
Error	56.4102		



Level of IOP	N	diff	
		Mean	Std Dev
1	134	3.53264925	1.42216023
2	229	3.69325328	1.24359782
3	23	4.66304348	2.00936542

the diameter of the clear zone

The SAS System

The TTEST Procedure

Variable: diff

DCZ	N	Mean	Std Dev	Std Err	Minimum	Maximum
3	133	4.6936	1.4000	0.1214	0.8750	8.6250
3.5	129	3.5281	1.0788	0.0950	1.1250	6.6250
Diff (1-2)		1.1655	1.2522	0.1547		

DCZ	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
3		4.6936	4.4535 4.9337	1.4000	1.2495 1.5919
3.5		3.5281	3.3402 3.7160	1.0788	0.9613 1.2293
Diff (1-2)	Pooled	1.1655	0.8608 1.4702	1.2522	1.1532 1.3699
Diff (1-2)	Satterthwaite	1.1655	0.8619 1.4691		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	260	7.53	<.0001
Satterthwaite	Unequal	247.46	7.56	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	132	128	1.68	0.0032

Variable: diff

DCZ	N	Mean	Std Dev	Std Err	Minimum	Maximum
3	133	4.6936	1.4000	0.1214	0.8750	8.6250
4	124	2.7984	0.8646	0.0776	1.0000	6.5000
Diff (1-2)		1.8952	1.1726	0.1464		

DCZ	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
3		4.6936	4.4535 4.9337	1.4000	1.2495 1.5919
4		2.7984	2.6447 2.9521	0.8646	0.7687 0.9880
Diff (1-2)	Pooled	1.8952	1.6069 2.1835	1.1726	1.0791 1.2841
Diff (1-2)	Satterthwaite	1.8952	1.6112 2.1792		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	255	12.95	<.0001
Satterthwaite	Unequal	222.18	13.15	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	132	123	2.62	<.0001

The TTEST Procedure

Variable: diff

DCZ	N	Mean	Std Dev	Std Err	Minimum	Maximum
3.5	129	3.5281	1.0788	0.0950	1.1250	6.6250
4	124	2.7984	0.8646	0.0776	1.0000	6.5000
Diff (1-2)		0.7297	0.9797	0.1232		

DCZ	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
3.5		3.5281	3.3402 3.7160	1.0788	0.9613 1.2293
4		2.7984	2.6447 2.9521	0.8646	0.7687 0.9880
Diff (1-2)	Pooled	0.7297	0.4870 0.9723	0.9797	0.9010 1.0736
Diff (1-2)	Satterthwaite	0.7297	0.4880 0.9713		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	251	5.92	<.0001
Satterthwaite	Unequal	243.2	5.95	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	128	123	1.56	0.0139

The SAS System

The TTEST Procedure

Variable: SEX (PATIENT SEX)

YR1REF	N	Mean	Std Dev	Std Err	Minimum	Maximum
0	135	1.4222	0.4958	0.0427	1.0000	2.0000
1	251	1.4940	0.5010	0.0316	1.0000	2.0000
Diff (1-2)		-0.0718	0.4992	0.0533		

YR1REF	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
0		1.4222	1.3378 1.5066	0.4958	0.4428 0.5631
1		1.4940	1.4317 1.5563	0.5010	0.4606 0.5491
Diff (1-2)	Pooled	-0.0718	-0.1765 0.0329	0.4992	0.4662 0.5371
Diff (1-2)	Satterthwaite	-0.0718	-0.1763 0.0327		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	-1.35	0.1785
Satterthwaite	Unequal	276.85	-1.35	0.1775

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	250	134	1.02	0.9025

The SAS System

The TTEST Procedure

Variable: HXSFTCON (SOFT CONTACTS WORN PRIOR TO RK)

YR1REF	N	Mean	Std Dev	Std Err	Minimum	Maximum
0	135	1.2296	0.4222	0.0363	1.0000	2.0000
1	251	1.3745	0.4850	0.0306	1.0000	2.0000
Diff (1-2)		-0.1449	0.4640	0.0495		

YR1REF	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
0		1.2296	1.1578 1.3015	0.4222	0.3771 0.4795
1		1.3745	1.3142 1.4348	0.4850	0.4459 0.5315
Diff (1-2)	Pooled	-0.1449	-0.2422 -0.0475	0.4640	0.4334 0.4993
Diff (1-2)	Satterthwaite	-0.1449	-0.2384 -0.0514		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	-2.93	0.0036
Satterthwaite	Unequal	308.44	-3.05	0.0025

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	250	134	1.32	0.0740

The SAS System

The TTEST Procedure

Variable: BASEREF (REFRACTION AT BASELINE)

YR1REF	N	Mean	Std Dev	Std Err	Minimum	Maximum
0	135	-4.6380	1.3900	0.1196	-7.8750	-2.0000
1	251	-3.6484	1.2167	0.0768	-8.0000	-2.0000
Diff (1-2)		-0.9896	1.2799	0.1366		

YR1REF	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
0		-4.6380	-4.8746 -4.4014	1.3900	1.2417 1.5790
1		-3.6484	-3.7997 -3.4972	1.2167	1.1188 1.3336
Diff (1-2)	Pooled	-0.9896	-1.2582 -0.7210	1.2799	1.1954 1.3773
Diff (1-2)	Satterthwaite	-0.9896	-1.2696 -0.7096		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	-7.24	<.0001
Satterthwaite	Unequal	244.9	-6.96	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	134	250	1.31	0.0729

The SAS System

The TTEST Procedure

Variable: IOP (OCULAR PRESSURE)

YR1REF	N	Mean	Std Dev	Std Err	Minimum	Maximum
0	135	14.9235	3.3820	0.2911	8.0000	25.0000
1	251	14.1673	2.9682	0.1874	7.0000	22.0000
Diff (1-2)		0.7561	3.1188	0.3329		

YR1REF	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
0		14.9235	14.3478 15.4991	3.3820	3.0210 3.8417
1		14.1673	13.7983 14.5363	2.9682	2.7293 3.2533
Diff (1-2)	Pooled	0.7561	0.1016 1.4106	3.1188	2.9130 3.3562
Diff (1-2)	Satterthwaite	0.7561	0.0743 1.4379		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	2.27	0.0237
Satterthwaite	Unequal	245.45	2.18	0.0299

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	134	250	1.30	0.0789

The SAS System

The TTEST Procedure

Variable: AGE (PATIENT AGE AT SURGERY)

YR1REF	N	Mean	Std Dev	Std Err	Minimum	Maximum
0	135	34.1124	8.2820	0.7128	21.0021	58.0096
1	251	33.5984	6.9542	0.4389	21.0431	56.6954
Diff (1-2)		0.5140	7.4445	0.7946		

YR1REF	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
0		34.1124	32.7026 35.5222	8.2820	7.3981 9.4079
1		33.5984	32.7339 34.4629	6.9542	6.3944 7.6222
Diff (1-2)	Pooled	0.5140	-1.0482 2.0763	7.4445	6.9532 8.0111
Diff (1-2)	Satterthwaite	0.5140	-1.1351 2.1632		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	384	0.65	0.5181
Satterthwaite	Unequal	236.66	0.61	0.5398

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	134	250	1.42	0.0185

CODE

```

libname project "H:\506\project";
proc means data=project.perk;
    var diff age IOP;
run;
/*1*/
/*1a What refraction was obtained after surgery? var YR1REF */
data work.yyc1;
    set project.perk;
    diff= YR1REF-BASEREF;
    if -1 le YR1REF le 1 then good=1;else good=0;
run;
/*1b what change in refraction was induced*/

proc sort data= work.yyc1;
    by descending good;
run;
/*1c what percent of patients achived a good refractive outcome*/
proc freq data=work.yyc1;
    table good;
run;

/*2*/
data work.yyc2;
    set project.perk;
    diff= YR1REF-BASEREF;
run;
/*2a age and change two continuous random variable*/
data work.yyc2a;
    set work.yyc2;
    if age le 35 then age=0;
    else age=1;
run;
/*ttest in age and diffence*/
proc ttest data=work.yyc2a sides=2 alpha=0.05 h0=0;

```

```

class age;
var diff;
run;
/*anova in age and difference*/
data work.yyc2aa;
set work.yyc2;
    if age le 30 then age=0;
    else if age le 40 then age=1;
    else if age le 50 then age=2;
    else if age le 60 then age=3;
run;

ods graphics on;
proc anova data = work.yyc2aa;
    class age;
    model diff=age;
    means age /hovtest welch;
run;
ods graphics off;

/*2b gender one ordinal one continous*/
data work.yyc2b;
    set work.yyc2;
run;
/*ttest in gender and difference*/
ods graphics on;
proc ttest data=work.yyc2b sides=2 alpha=0.05 h0=0;
    class sex;
    var diff;
run;
ods graphics off;

/*2c use of soft contact lens before surgery one ordinal one continous*/
data work.yyc2c;
    set work.yyc2;
run;
ods graphics on;
proc ttest data=work.yyc2c sides=2 alpha=0.05 h0=0;
    class HXSFTCON;
    var diff;
run;
ods graphics off;

/*2d intraocular pressure 0 represent less or equal than 15*/
data work.yyc2da;
set work.yyc2;
    if IOP le 15 then IOP=0;
    else IOP=1;
run;
/*ttest in IOP and difference*/
proc ttest data=work.yyc2da sides=2 alpha=0.05 h0=0;
    class IOP;
    var diff;
run;
/*anova in IOP and difference*/
data work.yyc2db;
set work.yyc2;
    if IOP le 13 then IOP=1;
    else if IOP le 19 then IOP=2;
    else IOP=3;
run;

ods graphics on;

```

```

proc anova data = work.yyc2db;
  class IOP;
  model diff=IOP;
  means IOP /hovtest welch;
run;
ods graphics off;
/*2e the diameter of the clear zone*/
data work.yyc2e1;
  set work.yyc2;
  if DCZ=3 then delete;
run;
data work.yyc2e2;
  set work.yyc2;
  if DCZ=3.5 then delete;
run;
data work.yyc2e3;
  set work.yyc2;
  if DCZ=4 then delete;
run;
ods graphics on;
proc ttest data=work.yyc2e1 sides=2 alpha=0.05 h0=0;
  class DCZ;
  var diff;
run;
proc ttest data=work.yyc2e2 sides=2 alpha=0.05 h0=0;
  class DCZ;
  var diff;
run;
proc ttest data=work.yyc2e3 sides=2 alpha=0.05 h0=0;
  class DCZ;
  var diff;
run;
ods graphics off;

/*3*/
/*Are any of the patient characteristics related to whether or not
the patients obtained a good refractive outcome (-1 to +1 diopters)*/

data work.yyc3;
  set work.yyc1;
  if -1 le YR1REF le 1 then YR1REF=1;else YR1REF=0;
run;

proc ttest data=work.yyc3 sides=2 alpha=0.05 h0=0;
  class YR1REF;
  var sex;
run;

proc ttest data=work.yyc3 sides=2 alpha=0.05 h0=0;
  class YR1REF;
  var HXSFTCON;
run;

proc ttest data=work.yyc3 sides=2 alpha=0.05 h0=0;
  class YR1REF;
  var BASEREF;
run;
proc ttest data=work.yyc3 sides=2 alpha=0.05 h0=0;
  class YR1REF;
  var IOP;
run;
proc ttest data=work.yyc3 sides=2 alpha=0.05 h0=0;

```

```

        class YR1REF;
        var AGE;
run;

data work.yyc3a;
    set work.yyc3;
    if DCZ=3 then delete;
run;
data work.yyc3b;
    set work.yyc3;
    if DCZ=3.5 then delete;
run;
data work.yyc3c;
    set work.yyc3;
    if DCZ=4 then delete;
run;
ods graphics on;
proc ttest data=work.yyc3a sides=2 alpha=0.05 h0=0;
    class DCZ;
    var diff;
run;
proc ttest data=work.yyc3b sides=2 alpha=0.05 h0=0;
    class DCZ;
    var diff;
run;
proc ttest data=work.yyc3c sides=2 alpha=0.05 h0=0;
    class DCZ;
    var diff;
run;
ods graphics off;

```