

RANCANGAN PERCOBAAN DENGAN SAS

Oleh

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JURUSAN PENDIDIKAN MATEMATIKA

FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM

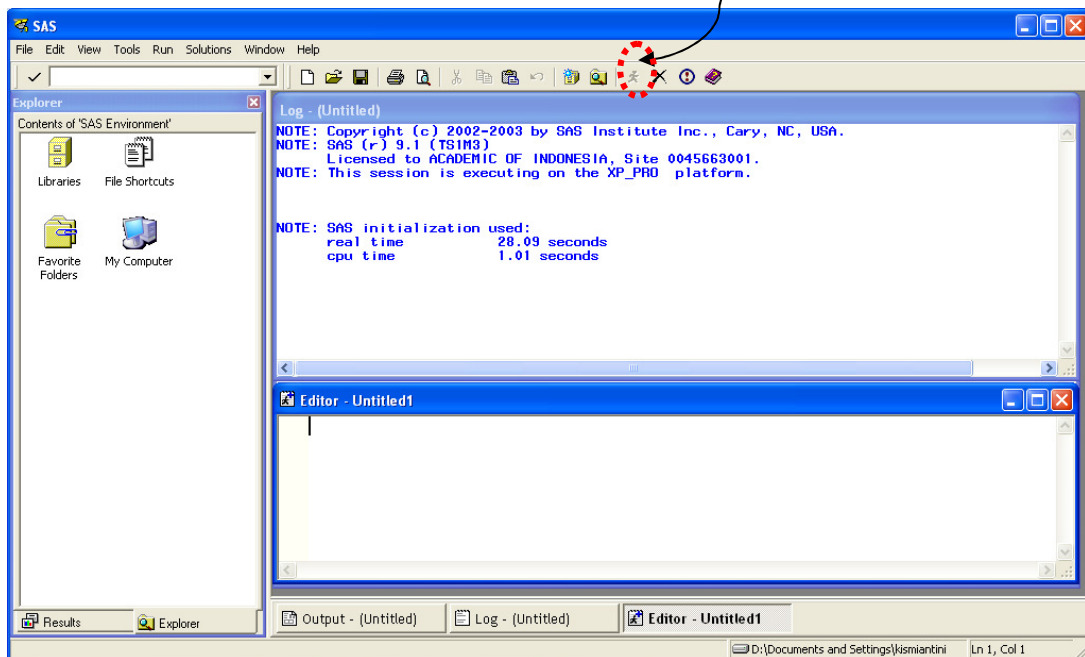
UNIVERSITAS NEGERI YOGYAKARTA

2010

SAS (Statistical Analysis System)

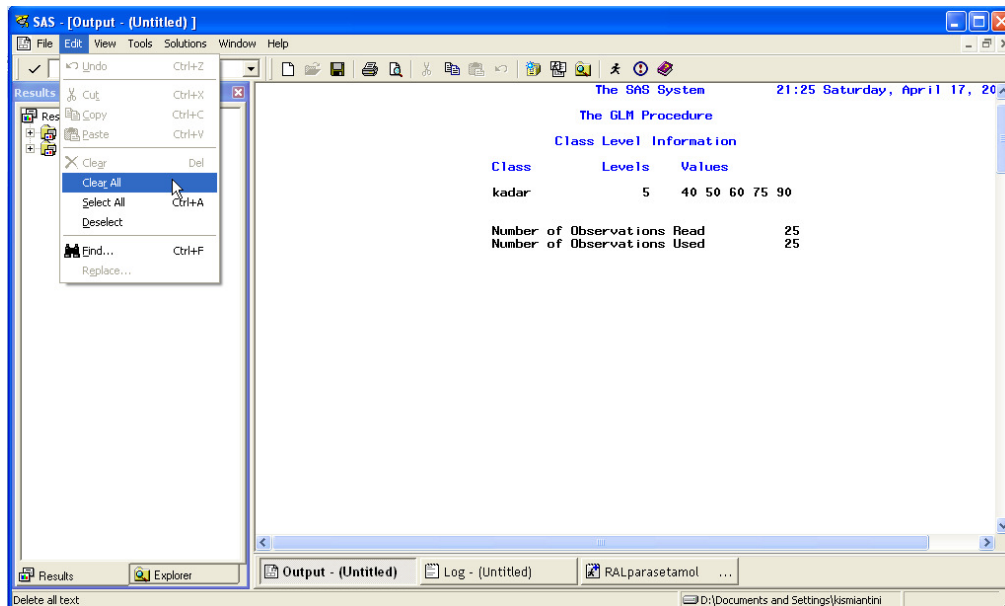
Berikut ini adalah window dari SAS.

Klik tombol ini untuk *running* program

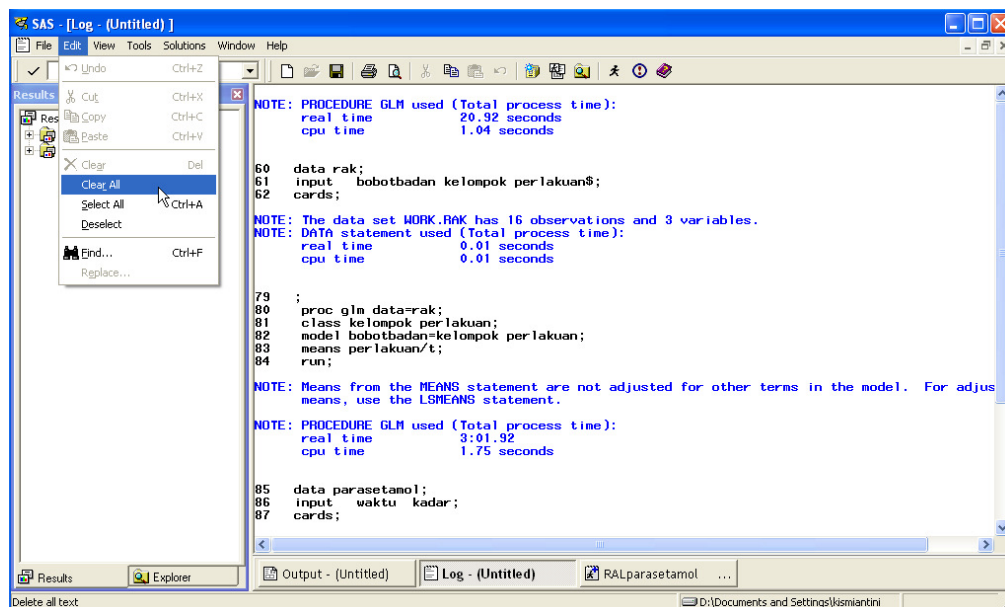


Gambar 1. SAS window

1. **Editor** : digunakan untuk memasukkan data dan menganalisis data dengan perintah tertentu. Untuk memudahkan memasukkan data, ketiklah data pada Microsoft Excell lalu *copy* dan *paste* di Editor SAS.
2. **Log** : menunjukkan bahwa program dapat berjalan dengan sukses atau gagal
3. **Output** : hasil output yang telah di run



Gambar 2. Output SAS



Gambar 3. Log SAS

Bila ingin menghapus hasil output atau hasil log, pilih **Edit** lalu tekan **Clear All**.

RANCANGAN ACAK LENGKAP DENGAN SAS

PROGRAM

```
data parasetamol;
input waktu kadar;
cards;
  7 40
  6 40
  9 40
  4 40
  7 40
  9 50
  7 50
  8 50
  6 50
  9 50
  5 60
  4 60
  8 60
  6 60
  3 60
  3 75
  5 75
  2 75
  3 75
  7 75
  2 90
  3 90
  4 90
  1 90
  4 90
;
proc glm data=parasetamol;
class kadar;
model waktu=kadar;
means kadar/duncan;
run;
```

Dapat diganti dengan mengetik t untuk BNT dan tukey untuk BNJ

LOG

NOTE: Copyright (c) 2002-2003 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) 9.1 (TS1M3)
Licensed to ACADEMIC OF INDONESIA, Site 0045663001.
NOTE: This session is executing on the XP_PRO platform.

NOTE: SAS initialization used:
real time 28.09 seconds
cpu time 1.01 seconds

1 data parasetamol;
2 input waktu kadar;
3 cards;

NOTE: The data set WORK.PARASETAMOL has 25 observations and 2 variables.
NOTE: DATA statement used (Total process time):
real time 4.78 seconds
cpu time 0.04 seconds

```

29 ;
30 proc glm data=parasetamol;
31 class kadar;
32 model waktu=kadar;
33 means kadar/duncan;
34 run;

```

OUTPUT

The GLM Procedure Class Level Information

Class	Levels	Values
kadar	5	40 50 60 75 90
Number of Observations Read		25
Number of Observations Used		25

The GLM Procedure

Dependent Variable: waktu

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	79.4400000	19.8600000	6.90	0.0012
Error	20	57.6000000	2.8800000		
Corrected Total	24	137.0400000			

R-Square	Coeff Var	Root MSE	waktu Mean
0.579685	32.14122	1.697056	5.280000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
kadar	4	79.4400000	19.8600000	6.90	0.0012
Source	DF	Type III SS	Mean Square	F Value	Pr > F
kadar	4	79.4400000	19.8600000	6.90	0.0012

The GLM Procedure

Duncan's Multiple Range Test for waktu

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	20
Error Mean Square	2.88

Number of Means	2	3	4	5
Critical Range	2.239	2.350	2.421	2.470

Means with the same letter are not significantly different.

Duncan Grouping	Mean	N	kadar
A	7.800	5	50
A			
B	6.600	5	40
B			
B	5.200	5	60
C			
D	4.000	5	75
D			
D	2.800	5	90

RANCANGAN ACAK KELOMPOK LENGKAP DENGAN SAS

PROGRAM

```
data rak;
input bobotbadan kelompok perlakuan$;
cards;
  8      1      A
  7      2      A
  9      3      A
  6      4      A
  1      1      B
  0      2      B
  3      3      B
  2      4      B
  6      1      C
  5      2      C
  7      3      C
  5      4      C
  5      1      D
  6      2      D
  9      3      D
  8      4      D
;
proc glm data=rak;
class kelompok perlakuan;
model bobotbadan=kelompok perlakuan;
means perlakuan/t;
run;
```

LOG

NOTE: PROCEDURE GLM used (Total process time):
real time 20.92 seconds
cpu time 1.04 seconds

```
60 data rak;
61 input bobotbadan kelompok perlakuan$;
62 cards;
```

NOTE: The data set WORK.RAK has 16 observations and 3 variables.

NOTE: DATA statement used (Total process time):
real time 0.01 seconds
cpu time 0.01 seconds

```
79 ;
80 proc glm data=rak;
81 class kelompok perlakuan;
82 model bobotbadan=kelompok perlakuan;
83 means perlakuan/t;
84 run;
```

NOTE: Means from the MEANS statement are not adjusted for other terms in the model. For adjusted means, use the LSMEANS statement.

OUTPUT

The GLM Procedure Class Level Information

Class	Levels	Values
kelompok	4	1 2 3 4
perlakuan	4	A B C D
Number of Observations Read		16
Number of Observations Used		16

The GLM Procedure

Dependent Variable: bobotbadan

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	103.3750000	17.2291667	18.11	0.0001
Error	9	8.5625000	0.9513889		
Corrected Total	15	111.9375000			

R-Square	Coeff Var	Root MSE	bobotbadan Mean
0.923506	17.93824	0.975392	5.437500

Source	DF	Type I SS	Mean Square	F Value	Pr > F
kelompok	3	14.18750000	4.72916667	4.97	0.0265
perlakuan	3	89.18750000	29.72916667	31.25	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
kelompok	3	14.18750000	4.72916667	4.97	0.0265
perlakuan	3	89.18750000	29.72916667	31.25	<.0001

The GLM Procedure

t Tests (LSD) for bobotbadan

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	0.951389
Critical Value of t	2.26216
Least Significant Difference	1.5602

Means with the same letter are not significantly different.

t Grouping	Mean	N	perlakuan
A	7.5000	4	A
A			
B	7.0000	4	D
B			
B	5.7500	4	C
C	1.5000	4	B

RANCANGAN BUJUR SANGKAR LATIN DENGAN SAS

PROGRAM

```
data rbsl1;
input nilai matakuliah$ perlakuan$ waktu$;
datalines;
      84   Aljabar      A      W1
      91   Aljabar      B      W2
      59   Aljabar      C      W3
      75   Aljabar      D      W4
      79   Geometri     B      W1
      82   Geometri     C      W2
      70   Geometri     D      W3
      91   Geometri     A      W4
      63   Statistika   C      W1
      80   Statistika   D      W2
      77   Statistika   A      W3
      75   Statistika   B      W4
      97   Kalkulus     D      W1
      93   Kalkulus     A      W2
      80   Kalkulus     B      W3
      68   Kalkulus     C      W4
;
proc anova;
class matakuliah perlakuan waktu;
model nilai=waktu matakuliah perlakuan;
means perlakuan/tukey;
run;
```

LOG

```
119 data rbsl1;
120 input nilai matakuliah$ perlakuan$ waktu$;
121 datalines;

NOTE: The data set WORK.RBSL1 has 16 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds

138 ;
139 proc anova;
140 class matakuliah perlakuan waktu;
141 model nilai=waktu matakuliah perlakuan;
142 means perlakuan/tukey;
143 run;
```

OUTPUT

```

                                The ANOVA Procedure

                                Class Level Information

Class          Levels  Values
matakuliah     4      Aljabar Geometri Kalkulus Statisti
perlakuan      4      A B C D
waktu          4      W1 W2 W3 W4

                                Number of Observations Read      16
                                Number of Observations Used       16
```


The ANOVA Procedure

Dependent Variable: nilai

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	1450.500000	161.166667	3.36	0.0768
Error	6	287.500000	47.916667		
Corrected Total	15	1738.000000			

R-Square	Coeff Var	Root MSE	nilai Mean
0.834580	8.762261	6.922187	79.00000

Source	DF	Anova SS	Mean Square	F Value	Pr > F
waktu	3	474.500000	158.166667	3.30	0.0994
matakuliah	3	252.500000	84.166667	1.76	0.2550
perlakuan	3	723.500000	241.166667	5.03	0.0446

The ANOVA Procedure

Tukey's Studentized Range (HSD) Test for nilai

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	47.91667
Critical Value of Studentized Range	4.89559
Minimum Significant Difference	16.944

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	perlakuan
A	86.250	4	A
A			
B A	81.250	4	B
B A			
B A	80.500	4	D
B A			
B	68.000	4	C

FAKTORIAL RAL DENGAN SAS

PROGRAM

```
data fakral;
input      respons jenis_pupuk varietas_padi;
cards;
64      1      1
66      1      1
70      1      1
72      1      2
81      1      2
64      1      2
74      1      3
51      1      3
65      1      3
65      2      1
63      2      1
58      2      1
57      2      2
43      2      2
52      2      2
47      2      3
58      2      3
67      2      3
59      3      1
68      3      1
65      3      1
66      3      2
71      3      2
59      3      2
58      3      3
39      3      3
42      3      3
58      4      1
41      4      1
46      4      1
57      4      2
61      4      2
53      4      2
53      4      3
59      4      3
38      4      3

;
proc glm data=fakral;
class jenis_pupuk varietas_padi;
model respons=jenis_pupuk varietas_padi jenis_pupuk*varietas_padi;
test h=jenis_pupuk e=jenis_pupuk*varietas_padi;
run;
```

LOG

```
NOTE: PROCEDURE ANOVA used (Total process time):
      real time           8:21.67
      cpu time            3.00 seconds
```

```
144 data fakral;
145 input      respons jenis_pupuk varietas_padi;
146 cards;
```

```
NOTE: SAS went to a new line when INPUT statement reached past the end of a line.
NOTE: The data set WORK.FAKRAL has 36 observations and 3 variables.
```

NOTE: DATA statement used (Total process time):

real time 0.04 seconds
cpu time 0.00 seconds

```
184 ;
185 proc glm data=fakral;
186 class jenis_pupuk varietas_padi;
187 model respons=jenis_pupuk varietas_padi jenis_pupuk*varietas_padi;
188 test h=jenis_pupuk e=jenis_pupuk*varietas_padi;
189 run;
```

OUTPUT

The GLM Procedure

Class Level Information

Class	Levels	Values
jenis_pupuk	4	1 2 3 4
varietas_padi	3	1 2 3

Number of Observations Read	36
Number of Observations Used	36

The GLM Procedure

Dependent Variable: respons

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	2277.222222	207.020202	3.31	0.0069
Error	24	1501.333333	62.555556		
Corrected Total	35	3778.555556			

R-Square	Coeff Var	Root MSE	respons Mean
0.602670	13.49438	7.909207	58.61111

Source	DF	Type I SS	Mean Square	F Value	Pr > F
jenis_pupuk	3	1156.555556	385.518519	6.16	0.0029
varietas_padi	2	349.388889	174.694444	2.79	0.0812
jenis_pup*varietas_p	6	771.277778	128.546296	2.05	0.0971

Source	DF	Type III SS	Mean Square	F Value	Pr > F
jenis_pupuk	3	1156.555556	385.518519	6.16	0.0029
varietas_padi	2	349.388889	174.694444	2.79	0.0812
jenis_pup*varietas_p	6	771.277778	128.546296	2.05	0.0971

Tests of Hypotheses Using the Type III MS for jenis_pup*varietas_p as an Error Term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
jenis_pupuk	3	1156.555556	385.518519	3.00	0.1170

PROGRAM

```
data fakral;
input respons lama dosis;
cards;
96 2 0
98 2 0
94 2 0
90 4 0
94 4 0
92 4 0
92 2 16
88 2 16
90 2 16
88 4 16
92 4 16
94 4 16
92 2 32
94 2 32
84 2 32
78 4 32
82 4 32
74 4 32
74 2 48
74 2 48
68 2 48
0 4 48
0 4 48
0 4 48
50 2 64
50 2 64
54 2 64
0 4 64
0 4 64
0 4 64
;
proc glm data=fakral;
class lama dosis;
model respons=lama dosis lama*dosis;
lsmeans lama*dosis / pdiff=all adjust=tukey;
run;
```

Dapat diganti dengan **bon,**
dunnet, scheffe, sidak

LOG

NOTE: PROCEDURE GLM used (Total process time):
real time 23.17 seconds
cpu time 1.32 seconds

1124 data fakral;
1125 input respons lama dosis;
1126 cards;

NOTE: The data set WORK.FAKRAL has 30 observations and 3 variables.
NOTE: DATA statement used (Total process time):
real time 0.04 seconds
cpu time 0.01 seconds

1157 ;
1158 proc glm data=fakral;
1159 class lama dosis;
1160 model respons=lama dosis lama*dosis;
1161 lsmeans lama*dosis / pdiff=all adjust=tukey;
1162 run;

OUTPUT

The GLM Procedure

Class Level Information

Class	Levels	Values
lama	2	2 4
dosis	5	0 16 32 48 64

Number of Observations Read 30
Number of Observations Used 30

The GLM Procedure

Dependent Variable: respons

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	37430.53333	4158.94815	503.10	<.0001
Error	20	165.33333	8.26667		
Corrected Total	29	37595.86667			

R-Square 0.995602
Coeff Var 4.351939
Root MSE 2.875181
respons Mean 66.06667

Source	DF	Type I SS	Mean Square	F Value	Pr > F
lama	1	5713.20000	5713.20000	691.11	<.0001
dosis	4	25459.20000	6364.80000	769.94	<.0001
lama*dosis	4	6258.13333	1564.53333	189.26	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
lama	1	5713.20000	5713.20000	691.11	<.0001
dosis	4	25459.20000	6364.80000	769.94	<.0001
lama*dosis	4	6258.13333	1564.53333	189.26	<.0001

The GLM Procedure
Least Squares Means
Adjustment for Multiple Comparisons: Tukey

lama	dosis	respons LSMEAN	LSMEAN Number
2	0	96.0000000	1
2	16	90.0000000	2
2	32	90.0000000	3
2	48	72.0000000	4
2	64	51.3333333	5
4	0	92.0000000	6
4	16	91.3333333	7
4	32	78.0000000	8
4	48	-0.0000000	9
4	64	0.0000000	10

Least Squares Means for effect lama*dosis
Pr > |t| for H0: LSMean(i)=LSMean(j)

Dependent Variable: respons

i/j	1	2	3	4	5	6	7	8	9	10
1		0.2987	0.2987	<.0001	<.0001	0.7813	0.6158	<.0001	<.0001	<.0001
2	0.2987		1.0000	<.0001	<.0001	0.9964	0.9998	0.0017	<.0001	<.0001
3	0.2987	1.0000		<.0001	<.0001	0.9964	0.9998	0.0017	<.0001	<.0001
4	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	0.2987	<.0001	<.0001
5	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001
6	0.7813	0.9964	0.9964	<.0001	<.0001		1.0000	0.0003	<.0001	<.0001
7	0.6158	0.9998	0.9998	<.0001	<.0001	1.0000		0.0005	<.0001	<.0001
8	<.0001	0.0017	0.0017	0.2987	<.0001	0.0003	0.0005		<.0001	<.0001
9	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		1.0000
10	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	1.0000	

FAKTORIAL RAKL DENGAN SAS

PROGRAM

```
data fakrakl;
input y metode intensitas kelompok;
label y='rata-rata nilai tes';
cards;
60 1 1 1
66 1 1 2
77 1 1 3
73 1 2 1
80 1 2 2
82 1 2 3
77 1 3 1
88 1 3 2
86 1 3 3
62 2 1 1
76 2 1 2
62 2 1 3
78 2 2 1
85 2 2 2
91 2 2 3
79 2 3 1
85 2 3 2
88 2 3 3
68 3 1 1
90 3 1 2
83 3 1 3
79 3 2 1
82 3 2 2
87 3 2 3
80 3 3 1
83 3 3 2
89 3 3 3
;
proc glm data=fakrakl;
class metode intensitas kelompok;
model y=metode intensitas metode*intensitas kelompok;
lsmeans metode*intensitas/pdiff=all adjust=bon;
run;
```

LOG

```
NOTE: PROCEDURE GLM used (Total process time):
      real time          2:06.45
      cpu time           1.18 seconds

106 data fakrakl;
107 input y metode intensitas kelompok;
108 label y='rata-rata nilai tes';
109 cards;

NOTE: The data set WORK.FAKRAKL has 27 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time          0.00 seconds
      cpu time           0.00 seconds

137 ;
138 proc glm data=fakrakl;
139 class metode intensitas kelompok;
140 model y=metode intensitas metode*intensitas kelompok;
141 lsmeans metode*intensitas/pdiff=all adjust=bon;
142 run;
```

OUTPUT

The GLM Procedure

Class Level Information

Class	Levels	Values
metode	3	1 2 3
intensitas	3	1 2 3
kelompok	3	1 2 3

Number of Observations Read 27
 Number of Observations Used 27

The GLM Procedure

Dependent Variable: y rata-rata nilai tes

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	1728.222222	172.822222	8.68	<.0001
Error	16	318.444444	19.902778		
Corrected Total	26	2046.666667			

R-Square 0.844408
 Coeff Var 5.639224
 Root MSE 4.461253
 y Mean 79.11111

Source	DF	Type I SS	Mean Square	F Value	Pr > F
metode	2	156.2222222	78.1111111	3.92	0.0410
intensitas	2	788.6666667	394.3333333	19.81	<.0001
metode*intensitas	4	255.1111111	63.7777778	3.20	0.0412
kelompok	2	528.2222222	264.1111111	13.27	0.0004

Source	DF	Type III SS	Mean Square	F Value	Pr > F
metode	2	156.2222222	78.1111111	3.92	0.0410
intensitas	2	788.6666667	394.3333333	19.81	<.0001
metode*intensitas	4	255.1111111	63.7777778	3.20	0.0412
kelompok	2	528.2222222	264.1111111	13.27	0.0004

The GLM Procedure

Least Squares Means

Adjustment for Multiple Comparisons: Bonferroni

metode	intensitas	y LSMEAN	LSMEAN Number
1	1	67.6666667	1
1	2	78.3333333	2
1	3	83.6666667	3
2	1	66.6666667	4
2	2	84.6666667	5
2	3	84.0000000	6
3	1	80.3333333	7
3	2	82.6666667	8
3	3	84.0000000	9

Least Squares Means for effect metode*intensitas
 Pr > |t| for H0: LSMean(i)=LSMean(j)

Dependent Variable: y

i/j	1	2	3	4	5	6	7	8	9
1		0.3544	0.0164	1.0000	0.0093	0.0135	0.1119	0.0290	0.0135
2	0.3544		1.0000	0.1996	1.0000	1.0000	1.0000	1.0000	1.0000
3	0.0164	1.0000		0.0093	1.0000	1.0000	1.0000	1.0000	1.0000
4	1.0000	0.1996	0.0093		0.0053	0.0077	0.0627	0.0164	0.0077
5	0.0093	1.0000	1.0000	0.0053		1.0000	1.0000	1.0000	1.0000
6	0.0135	1.0000	1.0000	0.0077	1.0000		1.0000	1.0000	1.0000
7	0.1119	1.0000	1.0000	0.0627	1.0000	1.0000		1.0000	1.0000
8	0.0290	1.0000	1.0000	0.0164	1.0000	1.0000	1.0000		1.0000
9	0.0135	1.0000	1.0000	0.0077	1.0000	1.0000	1.0000	1.0000	

RANCANGAN SPLIT PLOT DENGAN RAL MENGGUNAKAN SAS

PROGRAM

```
data splitplot;
input      i respons tanaman jarak r;
cards;
1      75.55 1      90      1
2      91.79 2      90      1
3      89.37 3      90      1
4      82.41 1      100     1
5      84.24 2      100     1
6      80.49 3      100     1
7      74.65 1      110     1
8      81.22 2      110     1
9      80.77 3      110     1
10     79.81 1      160     1
11     82.88 2      160     1
12     84.6  3      160     1
13     60.21 1      90      2
14     88.92 2      90      2
15     87.88 3      90      2
16     81.89 1      100     2
17     81.34 2      100     2
18     79.45 3      100     2
19     73.52 1      110     2
20     80.98 2      110     2
21     81.38 3      110     2
22     78.12 1      160     2
23     83.84 2      160     2
24     83.27 3      160     2
25     71.46 1      90      3
26     90.53 2      90      3
27     70.43 3      90      3
28     84.65 1      100     3
29     85.22 2      100     3
30     81.11 3      100     3
31     75.13 1      110     3
32     79.44 2      110     3
33     82.1  3      110     3
34     76.34 1      160     3
35     82.37 2      160     3
36     90.25 3      160     3
;
proc glm data=splitplot;
class tanaman jarak r;
model respons=tanaman r(tanaman) jarak tanaman*jarak ;
test h=tanaman e=r(tanaman);
lsmeans tanaman*jarak/pdiff=all adjust=tukey;
run;
```

LOG

```
NOTE: PROCEDURE GLM used (Total process time):
      real time          4:40.75
      cpu time           1.28 seconds
```

```
280 data splitplot;
281 input  i respons tanaman jarak r;
282 cards;
```

NOTE: The data set WORK.SPLITPLOT has 36 observations and 5 variables.

NOTE: DATA statement used (Total process time):

real time 0.01 seconds
cpu time 0.01 seconds

```
319 ;
320 proc glm data=splitplot;
321 class tanaman jarak r;
322 model respons=tanaman r(tanaman) jarak tanaman*jarak ;
323 test h=tanaman e=r(tanaman);
324 lsmeans tanaman*jarak/pdiff=all adjust=tukey;
325 run;
```

OUTPUT

The GLM Procedure

Class Level Information

Class	Levels	Values
tanaman	3	1 2 3
jarak	4	90 100 110 160
r	3	1 2 3

Number of Observations Read	36
Number of Observations Used	36

The GLM Procedure

Dependent Variable: respons

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	17	1044.849764	61.461751	3.28	0.0082
Error	18	337.500933	18.750052		
Corrected Total	35	1382.350697			

R-Square	Coeff Var	Root MSE	respons Mean
0.755850	5.342893	4.330133	81.04472

Source	DF	Type I SS	Mean Square	F Value	Pr > F
tanaman	2	451.6972056	225.8486028	12.05	0.0005
r(tanaman)	6	67.2314667	11.2052444	0.60	0.7285
jarak	3	77.2175639	25.7391880	1.37	0.2830
tanaman*jarak	6	448.7035278	74.7839213	3.99	0.0103

Source	DF	Type III SS	Mean Square	F Value	Pr > F
tanaman	2	451.6972056	225.8486028	12.05	0.0005
r(tanaman)	6	67.2314667	11.2052444	0.60	0.7285
jarak	3	77.2175639	25.7391880	1.37	0.2830
tanaman*jarak	6	448.7035278	74.7839213	3.99	0.0103

Tests of Hypotheses Using the Type III MS for r(tanaman) as an Error Term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
tanaman	2	451.6972056	225.8486028	20.16	0.0022

The GLM Procedure
Least Squares Means
Adjustment for Multiple Comparisons: Tukey

tanaman	jarak	respons LSMEAN	LSMEAN Number
1	90	69.0733333	1
1	100	82.9833333	2
1	110	74.4333333	3
1	160	78.0900000	4
2	90	90.4133333	5
2	100	83.6000000	6
2	110	80.5466667	7
2	160	83.0300000	8
3	90	82.5600000	9
3	100	80.3500000	10
3	110	81.4166667	11
3	160	86.0400000	12

Least Squares Means for effect tanaman*jarak
Pr > |t| for H0: LSMean(i)=LSMean(j)

Dependent Variable: respons

i/j	1	2	3	4	5	6
1		0.0331	0.9173	0.3707	0.0005	0.0234
2	0.0331		0.4411	0.9525	0.6280	1.0000
3	0.9173	0.4411		0.9943	0.0102	0.3495
4	0.3707	0.9525	0.9943		0.0787	0.9033
5	0.0005	0.6280	0.0102	0.0787		0.7306
6	0.0234	1.0000	0.3495	0.9033	0.7306	
7	0.1221	0.9998	0.8336	0.9998	0.2609	0.9987
8	0.0323	1.0000	0.4338	0.9496	0.6360	1.0000
9	0.0419	1.0000	0.5098	0.9740	0.5558	1.0000
10	0.1347	0.9997	0.8586	0.9999	0.2392	0.9978
11	0.0778	1.0000	0.7030	0.9974	0.3736	0.9999
12	0.0058	0.9987	0.1141	0.5394	0.9777	0.9998

Least Squares Means for effect tanaman*jarak
Pr > |t| for H0: LSMean(i)=LSMean(j)

Dependent Variable: respons

i/j	7	8	9	10	11	12
1	0.1221	0.0323	0.0419	0.1347	0.0778	0.0058
2	0.9998	1.0000	1.0000	0.9997	1.0000	0.9987
3	0.8336	0.4338	0.5098	0.8586	0.7030	0.1141
4	0.9998	0.9496	0.9740	0.9999	0.9974	0.5394
5	0.2609	0.6360	0.5558	0.2392	0.3736	0.9777
6	0.9987	1.0000	1.0000	0.9978	0.9999	0.9998
7		0.9998	1.0000	1.0000	1.0000	0.9049
8	0.9998		1.0000	0.9996	1.0000	0.9989
9	1.0000	1.0000		0.9999	1.0000	0.9962
10	1.0000	0.9996	0.9999		1.0000	0.8847
11	1.0000	1.0000	1.0000	1.0000		0.9673
12	0.9049	0.9989	0.9962	0.8847	0.9673	

RANCANGAN STRIP PLOT DENGAN RAK MENGGUNAKAN SAS

PROGRAM

```
data stripplot;
input      respons r varietas dosis;
cards;
2.05 1 1 1
2.5 1 2 1
2.15 1 3 1
2.6 1 4 1
3.3 1 1 2
3.25 1 2 2
3.25 1 3 2
2.95 1 4 2
2.95 1 1 3
2.85 1 2 3
2.75 1 3 3
3 1 4 3
2.25 2 1 1
2.6 2 2 1
2.5 2 3 1
2.5 2 4 1
3.5 2 1 2
2.95 2 2 2
3.45 2 3 2
3.05 2 4 2
2.9 2 1 3
3 2 2 3
3 2 3 3
2.85 2 4 3
2.45 3 1 1
2.45 3 2 1
2.35 3 3 1
2.25 3 4 1
3.45 3 1 2
3 3 2 2
3.5 3 3 2
3.15 3 4 2
2.95 3 1 3
3.15 3 2 3
3 3 3 3
2.95 3 4 3
;
proc glm data=stripplot;
class r varietas dosis;
model respons=r varietas r(varietas) dosis r(dosis) varietas*dosis
      r(varietas*dosis);
test h=varietas*dosis e=r(varietas*dosis);
run;
```

LOG

```
NOTE: PROCEDURE GLM used (Total process time):
      real time          15.68 seconds
      cpu time           0.62 seconds
```

```
421 data stripplot;
422 input      respons r varietas dosis;
423 cards;
```

```
NOTE: SAS went to a new line when INPUT statement reached past the end of a line.
NOTE: The data set WORK.STRIPLOT has 36 observations and 4 variables.
```

NOTE: DATA statement used (Total process time):

real time 0.00 seconds
cpu time 0.00 seconds

```
463 ;
464 proc glm data=stripplot;
465 class r varietas dosis;
466 model respons=r varietas r(varietas) dosis r(dosis) varietas*dosis r(varietas*dosis);
467 test h=varietas*dosis e=r(varietas*dosis);
468
469 run;
```

OUTPUT

The GLM Procedure

Class Level Information

Class	Levels	Values
r	3	1 2 3
varietas	4	1 2 3 4
dosis	3	1 2 3

Number of Observations Read 36
Number of Observations Used 36

The GLM Procedure

Dependent Variable: respons

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	35	5.39388889	0.15411111	.	.
Error	0	0.00000000	.	.	.
Corrected Total	35	5.39388889			

R-Square 1.000000
Coeff Var .
Root MSE .
respons Mean 2.855556

Source	DF	Type I SS	Mean Square	F Value	Pr > F
r	2	0.05597222	0.02798611	.	.
varietas	3	0.02611111	0.00870370	.	.
r(varietas)	6	0.13013889	0.02168981	.	.
dosis	2	4.43930556	2.21965278	.	.
r(dosis)	4	0.02986111	0.00746528	.	.
varietas*dosis	6	0.48180556	0.08030093	.	.
r(varietas*dosis)	12	0.23069444	0.01922454	.	.

Source	DF	Type III SS	Mean Square	F Value	Pr > F
r	2	0.05597222	0.02798611	.	.
varietas	3	0.02611111	0.00870370	.	.
r(varietas)	6	0.13013889	0.02168981	.	.
dosis	2	4.43930556	2.21965278	.	.
r(dosis)	4	0.02986111	0.00746528	.	.
varietas*dosis	6	0.48180556	0.08030093	.	.
r(varietas*dosis)	12	0.23069444	0.01922454	.	.

Tests of Hypotheses Using the Type III MS for r(varietas*dosis) as an Error Term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
varietas*dosis	6	0.48180556	0.08030093	4.18	0.0169