14.11

data one;

input Air$ Sweetener$ Milkfat$ Rating;

cards;

5 12 10 23

5 12 10 24

5 12 10 25

5 12 12 27

5 12 12 28

5 12 12 26

5 12 15 31

5 12 15 32

5 12 15 29

10 12 10 36

10 12 10 35

10 12 10 36

10 12 12 34

10 12 12 38

10 12 12 39

10 12 15 33

10 12 15 34

10 12 15 35

15 12 10 28

15 12 10 24

15 12 10 27

15 12 12 35

15 12 12 35

15 12 12 34

15 12 15 26

15 12 15 27

15 12 15 25

5 16 10 24

5 16 10 23

5 16 10 28

5 16 12 38

5 16 12 36

5 16 12 35

5 16 15 34

5 16 15 36

5 16 15 39

10 16 10 37

10 16 10 39

10 16 10 35

10 16 12 34

10 16 12 38

10 16 12 36

10 16 15 34

10 16 15 36

10 16 15 31

15 16 10 26

15 16 10 29

15 16 10 25

15 16 12 36

15 16 12 37

15 16 12 34

15 16 15 28

15 16 15 26

15 16 15 24

run;

proc glm data=one;

Class air sweetener milkfat;

model rating= air sweetener milkfat milkfat\*air sweetener\*milkfat sweetener\*air sweetener\*milkfat\*air;

output out= residual r=resid;

run;

14.12

data one;

input Air$ Sweetener$ Milkfat$ Rating;

cards;

5 12 10 23

5 12 10 24

5 12 10 25

5 12 12 27

5 12 12 28

5 12 12 26

5 12 15 31

5 12 15 32

5 12 15 29

10 12 10 36

10 12 10 35

10 12 10 36

10 12 12 34

10 12 12 38

10 12 12 39

10 12 15 33

10 12 15 34

10 12 15 35

15 12 10 28

15 12 10 24

15 12 10 27

15 12 12 35

15 12 12 35

15 12 12 34

15 12 15 26

15 12 15 27

15 12 15 25

5 16 10 24

5 16 10 23

5 16 10 28

5 16 12 38

5 16 12 36

5 16 12 35

5 16 15 34

5 16 15 36

5 16 15 39

10 16 10 37

10 16 10 39

10 16 10 35

10 16 12 34

10 16 12 38

10 16 12 36

10 16 15 34

10 16 15 36

10 16 15 31

15 16 10 26

15 16 10 29

15 16 10 25

15 16 12 36

15 16 12 37

15 16 12 34

15 16 15 28

15 16 15 26

15 16 15 24

run;

proc glm data=one;

Class air sweetener milkfat;

model rating= air sweetener milkfat milkfat\*air sweetener\*milkfat sweetener\*air sweetener\*milkfat\*air;

output out= residual r=resid;

run;

14.13

**Normality check:**

PROC UNIVARIATE NORMAL PLOT;

VAR RESid;

RUN;

**Equal Variances Assumption:**

proc glm data=one;

Class air sweetener milkfat;

model rating= air sweetener milkfat;

means air sweetener milkfat/hovtest=lavene;

run;

14.20

data soybeans;

input copper$ manganese$ yield;

cards;

1 20 1558

1 20 1578

1 50 2003

1 50 2033

1 80 2490

1 80 2470

1 110 2830

1 110 2810

3 20 1590

3 20 1610

3 50 2020

3 50 2051

3 80 2620

3 80 2632

3 110 2860

3 110 2841

5 20 1558

5 20 1550

5 50 2003

5 50 2010

5 80 2490

5 80 2690

5 110 2830

5 110 2910

7 20 1328

7 20 1427

7 50 2010

7 50 2031

7 80 2887

7 80 2832

7 110 2960

7 110 2941

run;

proc glm data= soybeans;

class copper manganese;

model yield = copper|manganese;

output out = residual r= resid;

run;

quit;