data pdata;

   input Pair Before After    difference;

   cards;

1    2.37   2.51 -0.14

2    3.17   2.65 0.52

3    3.07   2.60 0.47

4    2.73   2.40 0.33

5    3.49   2.31 1.18

6    4.35   2.28 2.07

7    3.65   0.94 2.71

8    3.97   2.21 1.76

9    3.21   3.29 -0.08

10    4.46  1.92 2.54

11    3.81  3.38 0.43

12    4.55  2.43 2.12

13    4.51  1.83 2.68

14    3.03  2.63 0.40

15    4.47  2.31 2.16

16    3.44  1.85 1.59

17    3.52  2.92 0.60

18    3.05  2.26 0.79

19    3.66  3.11 0.55

20    3.81  1.90 1.91

21    3.13  2.50 0.63

22    3.43  3.18 0.25

23    3.26  3.24 0.02

24    2.85  2.16 0.69

run;

proc glm data=pdata;

class Pair Before After;

model difference = Pair Before After;

random Pair /test;

output out=myout r=resid p=pred;

    lsmeans Pair /pdiff cl /\* e=Subject\*TypeMusic \*/;

run;

proc univariate;

   var diff;

run;

data before;

   set pdata;

   co = before;

   time="before";

   keep pair co time;

run;

data after;

   set pdata;

   co = after;

   time="after";

   keep pair co time;

run;

data prob15\_4;

   set before after;

run;

proc means data=prob15\_4;

   class time;

   var co;

run;

data prob15\_6;

    length typemusic $9.;

    input Subject TypeMusic TypingEfficiency;

    cards;

1 NoMusic 20

2 NoMusic 17

3 NoMusic 24

4 NoMusic 20

5 NoMusic 22

6 NoMusic 25

7 NoMusic 18

1 HardRock 20

2 HardRock 18

3 HardRock 23

4 HardRock 18

5 HardRock 21

6 HardRock 22

7 HardRock 19

1 Classical 24

2 Classical    20

3 Classical    27

4 Classical    22

5 Classical    24

6 Classical    28

7 Classical    16

run;

proc print;

run;

proc glm data=prob15\_6;

class TypeMusic subject;

model TypingEfficiency = Subject TypeMusic;

random TypeMusic /\* Subject\*TypeMusic \*/ /test;

output out=myout r=resid p=pred;

    lsmeans TypeMusic /pdiff cl /\* e=Subject\*TypeMusic \*/;

run;

proc gplot data=myout;

    plot resid\*pred =subject;

run;

data vroom;

   input Driver Model Blend $ MPG;

cards;

1    1 A    15.5

2    1 B    16.3

3    1 C    10.5

4    1 D    14.0

1    2 B    33.8

2    2 C    26.4

3    2 D    31.5

4    2 A    34.5

1    3 C    13.7

2    3 D    19.1

3    3 A    17.5

4    3 B    19.7

1    4 D    29.2

2    4 A    22.5

3    4 B    30.1

4    4 C    21.6

proc print data=vroom;

run;

proc glm data=vroom;;

   class Driver Model Blend;

   model MPG = Driver Model Blend;

   contrast 'Driver 1 vs The Other Drivers' Driver 3 -1 -1 -1;

      contrast 'Driver 2 vs The Other Drivers' Driver -1 3 -1 -1;

          contrast 'Driver 3 vs The Other Drivers' Driver -1 -1 3 -1;

              contrast 'Driver 4 vs The Other Drivers' Driver -1 -1 -1 3;

   contrast 'Model 1 vs The Other Cars' Model 3 -1 -1 -1;

      contrast 'Model 2 vs The Other Cars' Model -1 3 -1 -1;

          contrast 'Model 3 vs The Other Cars' Model -1 -1 3 -1;

              contrast 'Model 4 vs The Other Cars' Model -1 -1 -1 3;

   contrast 'Blend 1 vs The Other Blends' Blend 3 -1 -1 -1;

      contrast 'Blend 2 vs The Other Blends' Blend -1 3 -1 -1;

          contrast 'Blend 3 vs The Other Blends' Blend -1 -1 3 -1;

              contrast 'Blend 4 vs The Other Blends' Blend -1 -1 -1 3;

   lsmeans Blend /pdiff cl;

   /\* contrast 'brand A vs. B' treatment 1 -1 1 -1; \*/

run;