

```

options nocenter nodate;

proc import datafile="C:\z\Courses\S401f03\airplanedata.xls" out=one replace;
run;

proc print;
run;

proc glm data=one;
  class gender design;
  model distance=gender design gender*design / clparm;
  output out=check residual=ehat predicted=yhat;
  lsmeans gender*design / stderr slice=design;
  estimate 'male - female' gender -1 1;
  estimate 'male - female for Dart' gender -1 1 gender*design -1 0 0 1 0 0;
  estimate 'male - female for Floater' gender -1 1 gender*design 0 -1 0 0 1 0;
  estimate 'male - female for Flyer' gender -1 1 gender*design 0 0 -1 0 0 1;
run;

proc univariate plot;
  var ehat;
run;

proc plot;
  plot ehat*yhat;
run;

data dart; set one;
  if design='Dart';
run;

proc sort data=dart;
  by gender;
run;

proc univariate plot data=dart;
  var distance;
  by gender;
run;

```

Obs	Flight	Name	Gender	Design	Feet	Inches	distance
1	1	Oscar	m	Dart	36	0	432
2	2	Wei hong	f	Floater	0	0	0
3	3	Michael	m	Flyer	36	0	432
4	4	Jennifer	f	Floater	12	8	152
5	5	In-Koo	m	Dart	32	11	395
6	6	Rachel	f	Dart	18	3	219
7	7	Jason	m	Dart	26	7	319
8	8	Zhonglian	f	Flyer	18	3	219
9	9	Faneng	m	Flyer	6	4	76
10	10	Len	m	Flyer	19	11	239
11	11	Stacy	f	Dart	10	8	128
12	12	Keri	f	Floater	13	6	162
13	13	Nasser	m	Floater	.	.	.
14	14	Dongyan	f	Dart	9	2	110
15	15	Sang-Ho	m	Flyer	18	1	217
16	16	Jean	f	Floater	14	0	168
17	17	Xin	f	Floater	21	0	252
18	18	Matt	m	Flyer	14	9	177
19	19	Alex	f	Dart	16	9	201
20	20	Liyi ng	f	Dart	18	8	224
21	21	Embere	f	Flyer	26	6	318
22	22	Ying	f	Floater	7	6	90

23	23	Jeff	m	Floater	10	2	122
24	24	Marianela	f	Dart	21	2	254
25	25	Pete	m	Flyer	23	1	277
26	26	Bryce	m	Floater	13	0	156
27	27	Donggill	m	Floater	17	5	209
28	28	Rocio	f	Flyer	24	4	292
29	29	Penny	f	Floater	24	3	291
30	30	Ryan	m	Flyer	23	7	283
31	31	Cari	f	Flyer	15	8	188
32	32	Carrie	f	Dart	22	4	268
33	33	Yanling	f	Dart	25	8	308
34	34	Zhiping	m	Flyer	27	10	334
35	35	Kimberly	f	Floater	.	.	.
36	36	Julie	f	Dart	24	5	293
37	37	Lisa	f	Floater	16	2	194
38	38	Janet	f	Flyer	12	11	155
39	39	Nick	m	Floater	12	7	151
40	40	Kathryn	f	Dart	14	8	176

The GLM Procedure

Class Level Information

Class	Levels	Values
Gender	2	f m
Design	3	Dart Floater Flyer

Number of observations 40

NOTE: Due to missing values, only 38 observations can be used in this analysis.

Dependent Variable: distance distance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	128938.8605	25787.7721	4.03	0.0060
Error	32	204922.8500	6403.8391		
Corrected Total	37	333861.7105			

R-Square 0.386204 Coeff Var 35.85558 Root MSE 80.02399 distance Mean 223.1842

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Gender	1	24459.24096	24459.24096	3.82	0.0594
Design	2	64040.34475	32020.17237	5.00	0.0129
Gender*Design	2	40439.27482	20219.63741	3.16	0.0560

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Gender	1	28508.87868	28508.87868	4.45	0.0428
Design	2	97529.90392	48764.95196	7.61	0.0020
Gender*Design	2	40439.27482	20219.63741	3.16	0.0560

Least Squares Means

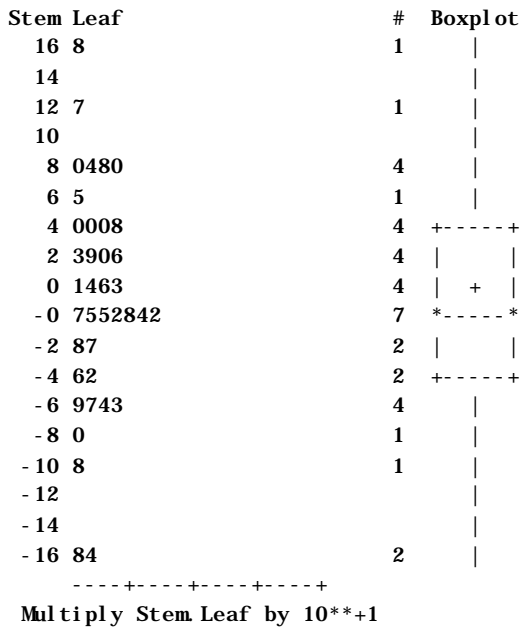
		distance	Standard Error	Pr > t
Gender	Design	LSMEAN	Error	
f	Dart	218.100000	25.305808	<.0001
f	Floater	163.625000	28.292753	<.0001
f	Flyer	234.400000	35.787817	<.0001
m	Dart	382.000000	46.201872	<.0001
m	Floater	159.500000	40.011995	0.0004
m	Flyer	254.375000	28.292753	<.0001

Gender*Design Effect Sliced by Design for distance

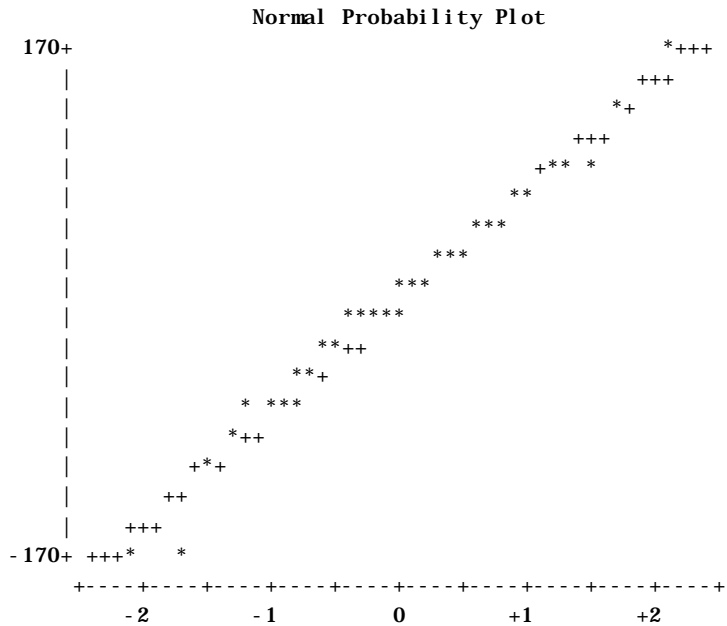
Design	DF	Sum of Squares	Mean Square	F Value	Pr > F
Dart	1	61992	61992	9.68	0.0039
Floater	1	45.375000	45.375000	0.01	0.9334
Flyer	1	1227.694231	1227.694231	0.19	0.6644

Parameter	Estimate	Standard Error	t Value	Pr > t
male - female	59.916667	28.3973478	2.11	0.0428
male - female for Dart	163.900000	52.6782396	3.11	0.0039
male - female for Floater	-4.125000	49.0044860	-0.08	0.9334
male - female for Flyer	19.975000	45.6206937	0.44	0.6644

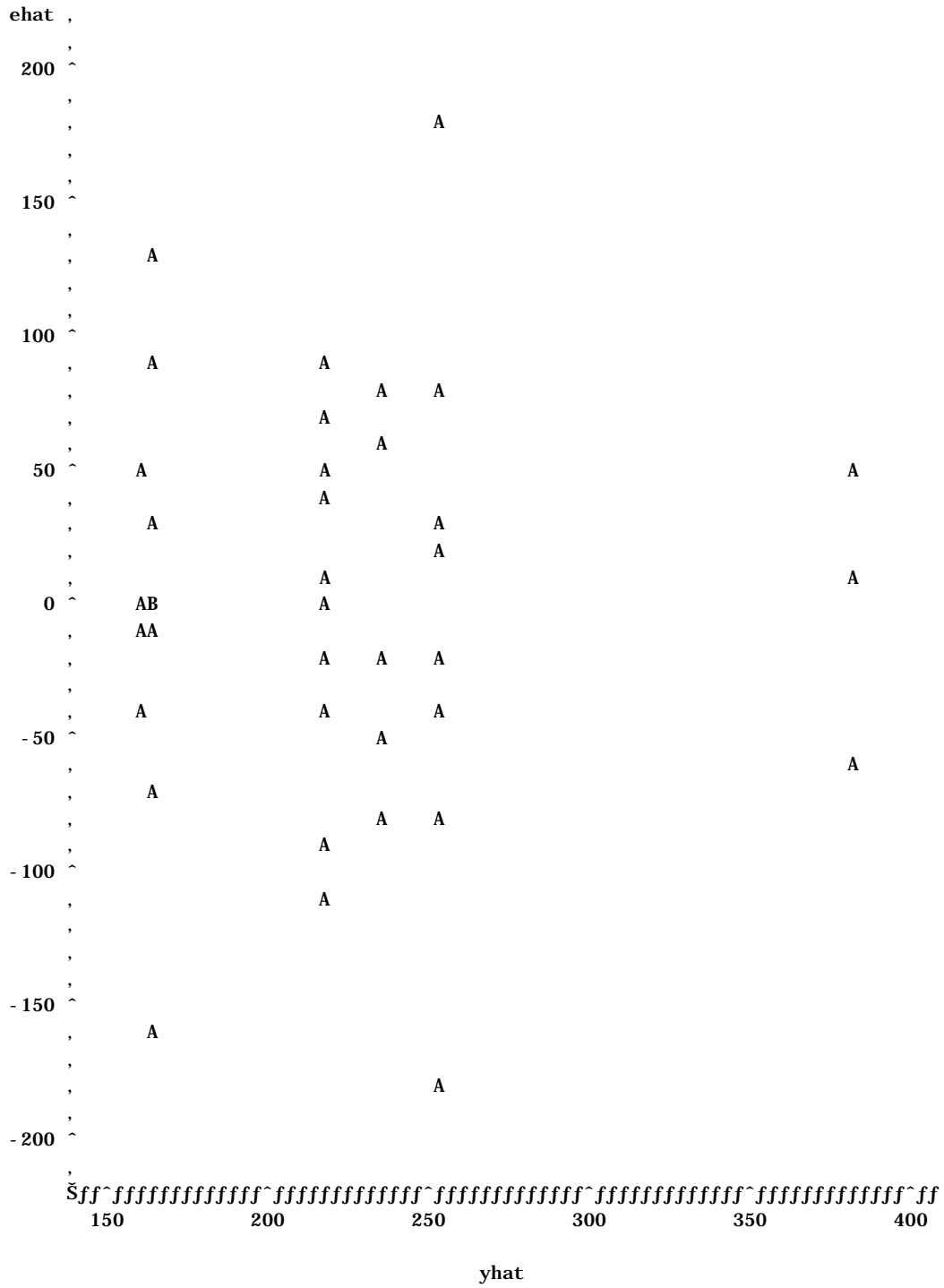
Parameter	95% Confidence Limits	
male - female	2.073162	117.760171
male - female for Dart	56.597937	271.202063
male - female for Floater	-103.943872	95.693872
male - female for Flyer	-72.951312	112.901312



Variable: ehat



Plot of ehat*yhat. Legend: A = 1 obs, B = 2 obs, etc.



NOTE: 2 obs had missing values.
The UNIVARIATE Procedure
Variable: distance (distance)

Schematic Plots

