**QUIT** ;

ods html close ;

ods html ;

TITLE ;

/\*\*\*

BIOSTATISTICS IN A NUTSHELL

Pascal Tyrrell, PhD Associate Professor

Department of Medical Imaging , Faculty of Medicine

Institute of Medical Science, Faculty of Medicine

Department of Statistical Sciences , Faculty of Arts and Science

Paul Corey, PhD Professor Emeritus

Biostatistics Program, Dalla Lana Faculty of Public Health

Institute of Medical Science, Faculty of Medicine

Department of Statistical Sciences, Faculty of Arts and Science

/\*\*\* PART 1 \*\*\*/

TITLE1 " FREQ PROCEDURE IS FIRST PROGRAM RUN " ;

**DATA** FINAL ; INPUT CURE $ N @@ ;

DATALINES ;

NO 2 YES 8

**RUN** ;

**PROC** **FREQ** DATA = FINAL ; WEIGHT N ;

TABLES CURE / BINOMIAL ; EXACT BINOMIAL ; **RUN** ;

**DATA** UNPAIRED ;

INPUT COLOUR $ RTIME @@ ;

DATALINES ;

GREEN 232.6 RED 232.0

GREEN 257.5 RED 250.5

GREEN 253.1 RED 237.1

GREEN 205.4 RED 201.5

GREEN 226.0 RED 211.1

**RUN** ;

**DATA** PAIRED ;

INPUT RTIMEG RTIMER @@ ;

DIFFRT = RTIMEG - RTIMER ;

DATALINES ;

232.6 232.0

257.5 250.5

253.1 237.1

205.4 201.5

226.0 211.1

**RUN** ;

**PROC** **SORT** DATA = UNPAIRED ; BY COLOUR ; **RUN** ;

**PROC** **MEANS** DATA = UNPAIRED N MEAN VAR STD STDERR MAXDEC = **3** ;

BY COLOUR ;

VAR RTIME ;

**RUN** ;

**PROC** **TTEST** DATA = UNPAIRED ;

CLASS COLOUR ; VAR RTIME ; **RUN** ;

**PROC** **MEANS** DATA = PAIRED N MEAN VAR STD STDERR T PRT MAXDEC = **3** ;

VAR RTIMEG RTIMER DIFFRT ;

**RUN** ;

TITLE1 " COMPARING TWO SAMPLE MEANS " ;

TITLE2 " ASSUMING A MATCHED PAIRED DESIGN " ;

**PROC** **TTEST** DATA = PAIRED; PAIRED RTIMEG \* RTIMER ; **RUN**;

**DATA** T1 ; INPUT GROUP DBP @@ ;

DATALINES ;

1 3 1 4 1 5 1 6 1 7

0 1 0 3 0 5 0 7 0 9 0 13 0 15 0 17 0 19 0 21

**RUN** ;

**PROC** **MEANS** N MEAN STD VAR MAXDEC = **2** ;

CLASS GROUP ; VAR DBP ; **RUN** ;

**PROC** **TTEST** DATA = T1 CI=NONE ;

CLASS GROUP ; VAR DBP ; **RUN** ;

**DATA** T2 ; INPUT GRP DBP @@ ; DATALINES ;

1 1 1 2 1 3 1 4 1 5 1 6 1 7 1 8 1 9 1 10

0 1 0 7 0 13 0 19 0 25

**RUN** ;

**PROC** **MEANS** N MEAN STD VAR T PRT MAXDEC = **2** ;

CLASS GRP ; VAR DBP ; **RUN** ;

**PROC** **TTEST** DATA = T2 CI = NONE ;

CLASS GRP ; VAR DBP ; **RUN** ;

/\*\*\* PART 2 \*\*\*/

TITLE1 " COMPARING SAME MEANS USING GLM PROCEDURE " ;

**DATA** STUDY ; INPUT COLOUR $ NAME $ ID RTIME ;

DATALINES ;

GREEN ABEL 1 232.6

RED ABEL 1 232.0

GREEN ADAM 2 257.5

RED ADAM 2 250.5

GREEN AMOS 3 253.1

RED AMOS 3 237.1

GREEN ANDY 4 205.4

RED ANDY 4 201.5

GREEN BART 5 226.0

RED BART 5 211.1

**RUN**; \*\* NOTE: MOST DATASETS HAVE A LINE OF DATA FOR EACH SUBJECT;

TITLE1 " ASSUMING A COMPLETELY RANDOMIZED DESIGN " ;

**PROC** **GLM** DATA = STUDY ; CLASS COLOUR ;

MODEL RTIME = COLOUR ;

LSMEANS COLOUR / TDIFF PDIFF STDERR CL ; **RUN** ;

TITLE1 " ASSUMING A RANDOMIZED BLOCK DESIGN " ;

**PROC** **GLM** DATA = STUDY ; CLASS COLOUR ID ;

MODEL RTIME = COLOUR ID ; \*\*Note ID in MODEL statement ;

LSMEANS COLOUR / TDIFF PDIFF STDERR CL ; **RUN** ;

TITLE1 " COMPARING TWO DRUGS ";

**PROC** **GLM** DATA=STUDY; CLASS DRUG SEX ;

MODEL RTIME =

DRUG SEX DRUG \* SEX AGE WEIGHT / SS3;

LSMEANS DRUG/TDIFF PDIFF STDERR CL;

LSMEANS SEX /TDIFF PDIFF STDERR CL; **RUN** ;

**DATA** REACTION ; INPUT MEAN10 EXERCISE $ ID COLOUR $ GROUP ;

DATALINES ;

0.28777 YES 7 RED 2

0.27179 NO 7 RED 4

0.37966 NO 7 GREEN 3

0.27569 YES 7 GREEN 1

0.24455 YES 2 GREEN 1

0.24683 NO 2 RED 4

0.26403 YES 2 RED 2

0.24303 NO 2 GREEN 3

0.29935 YES 8 RED 2

0.29268 YES 8 GREEN 1

0.29586 NO 8 RED 4

0.30994 NO 8 GREEN 3

0.32525 YES 16 RED 2

0.43577 NO 16 GREEN 3

0.40072 NO 16 RED 4

0.34072 YES 16 GREEN 1

0.31957 NO 18 GREEN 3

0.33224 YES 18 GREEN 1

0.29628 YES 18 RED 2

0.28355 NO 18 RED 4

0.34297 YES 1 GREEN 1

0.38213 NO 1 GREEN 3

0.29460 YES 1 RED 2

0.32074 NO 1 RED 4

0.31300 NO 17 RED 4

0.37588 YES 17 RED 2

0.40757 NO 17 GREEN 3

0.39778 YES 17 GREEN 1

0.28789 NO 24 RED 4

0.25001 YES 24 GREEN 1

0.26809 NO 24 GREEN 3

0.24230 YES 24 RED 2

0.24596 YES 9 GREEN 1

0.23029 NO 9 RED 4

0.26610 NO 9 GREEN 3

0.23112 YES 9 RED 2

0.22730 NO 13 RED 4

0.24637 YES 13 GREEN 1

0.24764 YES 13 RED 2

0.25930 NO 13 GREEN 3

0.29499 YES 10 GREEN 1

0.38668 NO 10 GREEN 3

0.36707 NO 10 RED 4

0.29197 YES 10 RED 2

0.30416 YES 20 RED 2

0.30555 NO 20 RED 4

0.35767 YES 20 GREEN 1

0.41489 NO 20 GREEN 3

0.25466 NO 14 RED 4

0.25265 NO 14 GREEN 3

0.26132 YES 14 GREEN 1

0.25173 YES 14 RED 2

0.30490 NO 21 GREEN 3

0.27330 YES 21 RED 2

0.28878 NO 21 RED 4

0.27457 YES 21 GREEN 1

0.33627 NO 3 GREEN 3

0.25822 YES 3 GREEN 1

0.27903 NO 3 RED 4

0.24274 YES 3 RED 2

0.28851 NO 4 GREEN 3

0.28853 YES 4 RED 2

0.29192 YES 4 GREEN 1

0.28706 NO 4 RED 4

0.46655 YES 23 GREEN 1

0.47720 YES 23 RED 2

0.40934 NO 23 RED 4

0.45355 NO 23 GREEN 3

0.24784 NO 19 RED 4

0.29878 YES 19 RED 2

0.26728 YES 19 GREEN 1

0.23754 NO 19 GREEN 3

0.29262 YES 5 RED 2

0.47031 NO 5 GREEN 3

0.38219 YES 5 GREEN 1

0.33895 NO 5 RED 4

0.26020 YES 15 GREEN 1

0.27863 YES 15 RED 2

0.26971 NO 15 GREEN 3

0.26824 NO 15 RED 4

0.25714 NO 6 RED 4

0.27317 NO 6 GREEN 3

0.25564 YES 6 RED 2

0.23553 YES 6 GREEN 1

0.26463 YES 12 RED 2

0.30168 YES 12 GREEN 1

0.32871 NO 12 GREEN 3

0.32457 NO 12 RED 4

0.31941 NO 22 GREEN 3

0.29038 NO 22 RED 4

0.32349 YES 22 RED 2

0.31428 YES 22 GREEN 1

0.44340 NO 11 GREEN 3

0.43223 NO 11 RED 4

0.39374 YES 11 RED 2

0.43905 YES 11 GREEN 1

**RUN** ;

**PROC** **GLM** DATA = REACTION ;

CLASS GROUP ;

MODEL MEAN10 = GROUP / SS3 ;

LSMEANS GROUP/ ADJUST=T TDIFF PDIFF CL ;

**RUN** ;

**PROC** **GLM** DATA=REACTION ;

CLASS GROUP ID ;

MODEL MEAN10 = GROUP ID / SS3 ;

LSMEANS GROUP/ADJUST=T TDIFF PDIFF CL;

LSMEANS GROUP/ADJUST=TUKEY TDIFF PDIFF CL;

**RUN** ;

**PROC** **GLM** DATA=REACTION ;

CLASS COLOUR EXERCISE ;

MODEL MEAN10 = COLOUR EXERCISE COLOUR\*EXERCISE /SS3;

LSMEANS COLOUR /ADJUST=T TDIFF PDIFF CL;

LSMEANS EXERCISE /ADJUST=T TDIFF PDIFF CL;

LSMEANS COLOUR\*EXERCISE/ADJUST=T TDIFF PDIFF CL;

**RUN** ;

**PROC** **GLM** DATA=REACTION ;

CLASS COLOUR EXERCISE ID ;

MODEL MEAN10 = COLOUR EXERCISE COLOUR\*EXERCISE ID /SS3;

LSMEANS COLOUR /ADJUST=T TDIFF PDIFF CL;

LSMEANS EXERCISE /ADJUST=T TDIFF PDIFF CL;

LSMEANS COLOUR\*EXERCISE/ADJUST=tukey TDIFF PDIFF CL;

**RUN** ;

**PROC** **GLM** DATA = DRUGS ;

CLASS DRUG SEX ;

MODEL FVC = DRUG SEX AGE HEIGHT WEIGHT ;

LSMEANS DRUG ;

LSMEANS SEX ;

**RUN** ;

/\*\*\* PART 3 \*\*\*/

**DATA** UNPAIRED ; INPUT ID $ EXER HGT FVC @@ ;

EXERCISE = "YES" ;

IF EXER=**0** THEN EXERCISE=" NO"; DATALINES ;

 1 0 120 1.00 2 0 130 1.40 3 0 135 2.04

 4 0 145 2.00 5 0 140 2.70 6 0 150 2.00

 7 0 155 3.25 8 0 160 2.50 9 0 170 3.20

10 0 190 4.50

11 1 140 1.92 12 1 150 3.30 13 1 154 3.00

14 1 143 2.82 15 1 164 3.55 16 1 170 4.30

17 1 174 3.68 18 1 172 2.78 19 1 174 4.20

20 1 183 4.28

**RUN** ;

**DATA** PAIRED ; INPUT ID $ EXER HGT FVC @@ ;

EXERCISE = "YES" ;

IF EXER=**0** THEN EXERCISE =" NO"; DATALINES ;

 1 0 120 1.00 2 0 130 1.40 3 0 135 2.04

 4 0 145 2.00 5 0 140 2.70 6 0 150 2.00

 7 0 155 3.25 8 0 160 2.50 9 0 170 3.20

10 0 190 4.50

 1 1 140 1.92 2 1 150 3.30 3 1 154 3.00

 4 1 143 2.82 5 1 164 3.55 6 1 170 4.30

 7 1 174 3.68 8 1 172 2.78 9 1 174 4.20

10 1 183 4.28

**RUN** ;

**DATA** PAIRS ; INPUT FVC1 FVC2 @@ ;

DFVC = FVC1 - FVC2 ;

DATALINES ;

1.00 1.92 1.40 3.30 2.04 3.00 2.00 2.82

2.70 3.55 2.00 4.30 3.25 3.68 2.50 2.78

3.20 4.20 4.50 4.28

**RUN** ;

**PROC** **MEANS** DATA = PAIRS N MEAN VAR STDDEV ;

VAR FVC1 FVC2 DFVC ;

**RUN** ;

**PROC** **TTEST** DATA = PAIRS ; PAIRED FVC1 \* FVC2 ; **RUN** ;

**PROC** **CORR** DATA = PAIRS ; VAR FVC1 FVC2 ; **RUN** ;

**PROC** **GPLOT** DATA = PAIRS ; PLOT FVC1 \* FVC2 ; **RUN** ;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\* Var(X2 - X1) = Var(X2) + Var(X1) - 2 x Std(X2) x Std(X1) x R \*

\* 0.537 = 1.028 + 0.600 - 2 x 1.014 x 0.775 x 0.694 \*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

**PROC** **GLM** DATA = PAIRS ;

MODEL FVC2 = FVC1 ;

**RUN** ;

**PROC** **TTEST** DATA = PAIRS ; \*\*<< Done ;

VAR DFVC ;

**RUN** ;

**PROC** **GLM** DATA = PAIRED ;

CLASS EXERCISE ID ;

MODEL FVC = EXERCISE ID / SS3 ;

LSMEANS EXERCISE / TDIFF PDIFF STDERR CL ;

**RUN** ;

**PROC** **TTEST** DATA = UNPAIRED ;

CLASS EXERCISE ;

VAR FVC ;

**RUN** ;

**PROC** **GLM** DATA = unpaired ;

class exer ;

MODEL FVC = EXER HGT ; **RUN** ;

**PROC** **TTEST** DATA = UNPAIRED CL = NONE ; \*\*<< Done;

CLASS EXERCISE ;

VAR FVC ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED;

CLASS EXERCISE ;

MODEL FVC = EXERCISE / SS3 ;

LSMEANS EXERCISE / TDIFF PDIFF STDERR CL ;

**RUN** ;

**PROC** **SORT** DATA = STUDY ; BY EXER ; **RUN** ;

**PROC** **TTEST** DATA = UNPAIRED ;

CLASS EXERCISE ;

VAR HGT ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED ;

BY EXER ;

MODEL FVC = HGT ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED ;

CLASS EXERCISE ;

MODEL FVC = EXERCISE HGT EXERCISE\*HGT /SS3 solution ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED ;

CLASS EXERCISE ;

MODEL FVC = exercise EXERCISE\*HGT / noint SS3 solution ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED ;

CLASS EXERCISE ;

MODEL FVC = EXERCISE HGT / SOLUTION SS3 ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED ;

by EXERCISE ;

MODEL FVC = HGT / SOLUTION SS3 ;

**RUN** ;

**DATA** UNPAIRED\_I ; INPUT ID $ EXER HGT FVC @@ ;

EXERCISE = "YES" ;

IF EXER=**0** THEN EXERCISE=" NO"; DATALINES ;

 1 0 120 1.00 2 0 130 1.40 3 0 135 2.04

 4 0 145 2.00 5 0 140 2.70 6 0 150 2.00

 7 0 155 3.25 8 0 160 2.50 9 0 170 3.20

10 0 190 4.45

11 1 140 2.12 12 1 150 3.10 13 1 154 3.10

14 1 143 2.22 15 1 164 3.65 16 1 170 4.40

17 1 174 4.01 18 1 172 3.98 19 1 174 4.80

20 1 183 5.28

**RUN** ;

**PROC** **TTEST** DATA = UNPAIRED\_I CL = NONE ;

CLASS EXERCISE ;

VAR FVC ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED\_I ;

Class EXERCISE ;

MODEL HGT = EXERCISE / SOLUTION SS3 ;

**RUN** ;

**PROC** **GLM** DATA = UNPAIRED\_I ;

MODEL FVC = HGT / SOLUTION SS3 ;

**RUN** ;

**PROC** **GLM** DATA = unpaired\_I ;

class exer ;

MODEL FVC = EXER|HGT / solution SS3 ;

lsmeans exer\*HGT /TDIFF PDIFF ; **RUN** ;

**PROC** **GLM** DATA = unpaired\_I ;

class exer ;

MODEL FVC = EXER HGT\*EXER / NOINT solution ;

lsmeans exer /TDIFF PDIFF ; **RUN** ;

**PROC** **GLM** DATA = unpaired\_I ;

by exercise ;

MODEL FVC = HGT / solution SS3 ;

**RUN** ;

**DATA** INBRED ; INPUT INBRED @@ ;

GROUP = "INBRED " ; DATALINES;

139 163 160 160 147 149 149 122

132 144 130 144 102 124 144

**RUN**;

**DATA** CROSSED ; INPUT CROSSED @@ ;

GROUP = "CROSSED" ; DATALINES;

188 96 168 176 153 172 177 163

146 173 186 168 177 184 96

**RUN**;

**DATA** WIDE; MERGE CROSSED INBRED;

DROP GROUP; PAIR = \_N\_ ;

DIFF = CROSSED - INBRED ; **RUN**;

TITLE1 "CROSSED AND INBRED PLANTS";

**PROC** **PRINT** DATA = WIDE NOOBS; **RUN**;

TITLE1 "ASSUMING PLANTS WERE PAIRED";

**PROC** **MEANS** DATA=WIDE MEAN T PRT CLM MAXDEC=**1**;

VAR CROSSED INBRED DIFF ; **RUN** ;

**PROC** **TTEST** DATA=WIDE; PAIRED CROSSED\*INBRED; **RUN**;

TITLE1 "PEARSON CORRELATION COEFFICIENT";

**PROC** **CORR** DATA=WIDE; VAR CROSSED INBRED; **RUN**;

TITLE1 " CREATING TWO DATASETS ";

TITLE2 "IGNORING POSSIBLE PAIRING";

**DATA** LONGCROSS; SET CROSSED;

GROUP = "CROSSED"; HEIGHT=CROSSED; **RUN**;

**DATA** LONGINBRED ; SET INBRED ;

GROUP = "INBRED "; HEIGHT=INBRED; **RUN**;

**DATA** LONG; SET LONGCROSS LONGINBRED; **RUN**;

**PROC** **GLM** DATA=LONG ; CLASS GROUP ;

MODEL HEIGHT = GROUP / SS3 ; **RUN**;

**PROC** **TTEST** DATA = LONG ;

CLASS GROUP ;

VAR HEIGHT ;

**RUN** ;

/\*\*\* PART 4 \*\*\*/

**DATA** T ;

INPUT GROUP $ SUCCESS $ N @@ ;

DATALINES ;

DRUG NO 3 DRUG YES 7

PLACEBO NO 8 PLACEBO YES 2

**RUN** ;

**PROC** **PRINT** DATA = T; **RUN** ;

**PROC** **FREQ** DATA = T ;

TABLES GROUP\*SUCCESS/ NOPERCENT NOCOL NOROW

CHISQ FISHER EXPECTED ;

WEIGHT N ;

**RUN** ;

**DATA** PERSONS ; INPUT GROUP $ SUCCESS $ @@;

DATALINES ;

DRUG NO DRUG NO DRUG NO DRUG YES

DRUG YES DRUG YES DRUG YES DRUG YES

DRUG YES DRUG YES

PLACEBO NO PLACEBO NO PLACEBO YES PLACEBO YES

PLACEBO YES PLACEBO YES PLACEBO YES PLACEBO YES

PLACEBO YES PLACEBO YES

**RUN** ;

**PROC** **FREQ** DATA = T ;

TABLES GROUP\*SUCCESS/ NOPERCENT NOCOL NOROW

CHISQ FISHER EXPECTED ;

**RUN** ;

**DATA** TTT ;

LIKELIHOOD0 = ((**11**/**20**)\*\***11**) \* ((**9**/**20**)\*\***9**) ;

LIKELIHOOD1 = (( **3**/**10**)\*\* **3**) \* ((**7**/**10**)\*\***7**) ;

LIKELIHOOD2 = (( **8**/**10**)\*\* **8**) \* ((**2**/**10**)\*\***2**) ;

LR = LIKELIHOOD0 / (LIKELIHOOD1 \* LIKELIHOOD2 ) ;

MINUS2LOGL = -**2** \* LOG(LR);

**RUN** ; **PROC** **PRINT** ; **RUN** ;

TITLE1 " LIKELIHOOD RATIO TEST ";

**DATA** TT ;

P1 = (**0.30**)\*\***3** \* (**0.70**)\*\***7** ;

P2 = (**0.80**)\*\***8** \* (**0.20**)\*\***2** ;

PH0 = (**0.55**)\*\***11** \* (**0.45**)\*\***9** ;

LR = PH0 / (P1 \* P2); MINUS2LOGLR = - **2** \* LOG(LR) ;

Z = SQRT(MINUS2LOGLR) ;

PVALUE1 = SDF('CHISQUARE' , MINUS2LOGLR, **1**) ;

PVALUE2 = **2** \* SDF('NORMAL', Z, **0**, **1**); **RUN** ;

**PROC** **PRINT** ; **RUN** ;

**DATA** T ;

INPUT DRUG $ SUCCESS $ N @@ ;

DATALINES ;

ASPIRIN NO 3 ASPIRIN YES 7

PLACEBO NO 8 PLACEBO YES 2

**RUN** ;

**PROC** **LOGISTIC** DATA = T ;

CLASS DRUG (ref="ASPIRIN")/ param = ref ; WEIGHT N ;

MODEL SUCCESS = DRUG ; **RUN** ;

**PROC** **LOGISTIC** DATA = T ;

CLASS DRUG ; WEIGHT N ;

MODEL SUCCESS = DRUG SEX AGE ; **RUN** ;

/\*\*\* PART 6 \*\*\*/

OPTIONS PS=**65** LS=**100** NODATE NONUMBER ;

**DATA** HEADACHE ;

INPUT MINUTES GROUP CENSOR @@ ; DATALINES ;

11 1 0 12 1 0 19 1 0 19 1 0 19 1 0 19 1 0 21 1 0

20 1 0 21 1 0 21 1 0 20 1 0 21 1 0 20 1 0 21 1 0

25 1 0 27 1 0 30 1 0 14 2 0 16 2 0 16 2 0 21 2 0

21 2 0 23 2 0 23 2 0 23 2 0 23 2 0 23 2 0 24 2 0

24 2 0 30 2 0 21 1 1 24 1 1 25 2 1 26 2 1 32 2 1

30 2 1 32 2 1 20 2 1

;

**RUN** ;

**PROC** **SORT** DATA = HEADACHE ; BY CENSOR GROUP ; **RUN** ;

**PROC** **MEANS** DATA = HEADACHE N MEAN STDDEV CLM ;

VAR MINUTES ; **RUN** ;

**PROC** **MEANS** DATA = HEADACHE N MEAN STDDEV CLM ;

BY GROUP ; VAR MINUTES ; **RUN** ;

**PROC** **MEANS** DATA = HEADACHE N MEAN STDDEV CLM ;

BY CENSOR GROUP ; VAR MINUTES ; **RUN** ;

**PROC** **LIFEREG** DATA = HEADACHE ; CLASS GROUP ;

MODEL MINUTES \* CENSOR( **1** ) = GROUP ;

**RUN** ;

**DATA** N30 ; SET HEADACHE ;

IF CENSOR = **0** ; **RUN** ;

**PROC** **LIFEREG** DATA = N30 ;

MODEL MINUTES = GROUP ; **RUN** ;

**DATA** N8 ; SET HEADACHE; IF CENSOR = **1** ; **RUN** ;

**PROC** **LIFEREG** DATA = N8 ; MODEL MINUTES = GROUP ; **RUN** ;

**PROC** **FORMAT** ; VALUE RX **1** = "DRUG X" **0** ="PLACEBO" ; **RUN** ;

**DATA** EXPOSED ; INPUT DAYS STATUS TREATMENT SEX $ @@ ;

FORMAT TREATMENT RX. ; DATALINES ;

179 1 1 F 378 0 1 M 256 1 1 F 355 1 1 M 262 1 1 M

319 1 1 M 256 1 1 F 256 1 1 M 255 1 1 M 171 1 1 F

224 0 1 F 325 1 1 M 225 1 1 F 325 1 1 M 287 1 1 M

217 1 1 F 319 1 1 M 255 1 1 F 264 1 1 M 256 1 1 F

237 0 0 F 291 1 0 M 156 1 0 F 323 1 0 M 270 1 0 M

253 1 0 M 257 1 0 M 206 1 0 F 242 1 0 M 206 1 0 F

157 1 0 F 237 1 0 M 249 1 0 M 211 1 0 F 180 1 0 F

229 1 0 F 226 1 0 F 234 1 0 F 268 0 0 M 209 1 0 F

**RUN** ;

ODS GRAPHICS ON ;

TITLE1 “ FIRST OF **2** ANALYSES “ ;

**PROC** **LIFETEST** DATA = EXPOSED

plots=(survival(atrisk=**0** to **1000** by **100** test)

 loglogs

 logsurv);

TIME DAYS \* STATUS ( **0** ) ;

STRATA TREATMENT ; **RUN** ;

ODS GRAPHICS OFF ;

TITLE1 “ SECOND ANALYSIS INCLUDES SEX VARIABLE ” ;

**PROC** **LIFETEST** DATA = EXPOSED NOTABLE ;

TIME DAYS \* STATUS( **0** ) ;

STRATA SEX / GROUP = TREATMENT ; **RUN** ;

/\*\*\* PART 7 \*\*\*/

**DATA** poisson\_expl ;

INPUT P\_VISITS HOUSING INCOME AGE\_HOUSING NEAREST\_CLINIC CLINIC\_DISTANCE @@ ;

DATALINES ;

 9 606 41393 3 3.04 6.32 10 392 36998 7 1.03 7.74 12 201 23864 43 4.80 8.74

 6 641 23635 18 1.95 8.89 0 828 85664 4 1.30 9.66 10 730 38647 9 0.67 7.92

28 505 55475 27 6.54 2.05 15 159 21238 4 2.98 8.66 8 738 58387 13 2.01 6.60

11 866 64646 31 1.67 5.81 9 830 47972 40 2.28 9.26 3 469 37242 40 1.42 8.37

 4 599 31972 7 0.72 8.11 16 234 33246 26 3.95 4.61 10 898 38337 32 2.63 9.56

 4 520 41755 23 2.24 6.81 29 1004 45927 24 4.90 2.69 10 780 68201 5 4.12 6.69

 0 354 46014 26 0.77 9.27 6 643 58315 8 0.78 6.26 15 622 41066 46 4.48 4.10

14 483 34626 1 3.51 7.92 26 741 69177 9 6.61 0.87 6 391 40873 19 1.67 6.90

16 1034 85207 13 4.23 4.40 13 306 40886 27 4.53 2.68 9 531 54655 40 2.32 5.69

13 456 33021 32 3.07 6.03 0 180 44588 14 0.88 9.38 21 566 49826 1 3.06 4.03

 9 19 39198 22 2.96 6.09 8 644 47347 35 2.94 7.69 13 410 29013 50 2.68 7.58

14 530 38794 5 2.77 6.08 8 109 31791 9 4.37 9.31 8 719 78082 31 2.70 4.89

 5 337 30855 1 1.33 9.86 21 809 42740 17 4.10 4.75 6 684 57506 51 2.13 8.31

 9 586 28852 7 2.98 8.64 12 722 59175 35 2.38 5.09 8 865 47118 46 2.17 9.06

 9 1113 120065 9 3.58 5.26 26 1006 48862 48 5.04 2.21 21 1031 72373 48 6.27 1.75

 7 525 32229 3 1.27 7.56 3 786 54678 20 3.59 8.52 7 862 67787 1 2.10 8.63

 4 377 36828 15 1.92 8.91 7 1041 59835 40 1.68 7.59 19 758 40305 15 3.95 5.58

26 1127 90302 26 5.83 1.74 5 524 51756 39 0.57 9.10 13 1141 50026 45 2.79 6.18

32 877 51707 27 5.19 3.66 9 725 34817 18 1.88 7.96 24 1289 98701 8 5.87 2.73

26 1007 89860 55 5.03 2.03 13 482 29942 14 3.17 6.91 7 674 58195 54 4.30 6.40

11 657 60513 32 4.38 8.30 28 666 68684 25 5.78 2.55 3 683 47991 57 1.54 9.52

12 302 42191 54 3.41 5.21 10 450 64790 3 4.35 6.03 8 650 63123 15 3.17 9.46

 3 603 28736 41 0.34 8.29 12 667 58535 25 2.78 5.59 9 406 39051 29 3.11 9.62

15 556 49129 33 4.78 3.89 6 921 42919 13 2.48 7.69 18 966 114633 38 6.33 2.22

12 635 29308 42 2.53 6.17 11 412 40722 32 2.47 9.43 12 1103 55773 44 4.58 8.68

 9 386 26734 14 4.99 9.70 12 526 42120 30 4.29 6.15 8 312 43393 41 2.25 6.43

14 1011 57862 54 4.60 3.94 11 523 28647 43 2.69 7.54 16 787 61765 53 5.39 3.37

10 925 70030 36 4.58 8.66 9 1066 61464 40 1.15 8.25 5 416 33348 48 1.48 7.66

22 898 46027 44 3.03 5.60 8 1001 70136 29 2.58 9.67 8 528 44541 31 4.91 9.67

 8 731 32202 43 5.15 9.67 9 669 34595 38 4.06 8.78 11 919 40795 8 2.97 7.79

 3 584 32871 13 1.47 8.02 8 582 30878 58 1.91 6.86 12 482 55972 9 2.91 5.85

11 439 29564 18 3.67 5.10 6 872 39366 52 0.73 8.67 14 781 33140 30 1.42 5.71

 2 153 46806 21 0.84 9.18 6 758 61563 31 3.08 8.33 17 120 19673 21 2.65 6.25

 6 1069 59805 22 2.50 9.43 15 782 38412 26 2.72 6.71 17 693 36190 6 4.70 9.54

11 443 42555 53 2.62 5.75 15 551 41045 2 3.62 7.45 6 348 25768 42 1.43 7.11

15 780 53974 47 4.21 6.41 10 752 71814 1 3.13 5.47 6 817 54429 47 1.90 9.90

 4 268 34022 54 1.20 9.51 6 519 52850 43 2.92 8.62

; **RUN** ;

**PROC** **GENMOD** DATA=POISSON\_EXPL;

MODEL P\_VISITS = HOUSING INCOME AGE\_HOUSING NEAREST\_CLINIC CLINIC\_DISTANCE / DIST = POISSON LINK = LOG;

OUTPUT OUT=TEMP P=MUHATI RESDEV=DEVI;

**RUN**;

**PROC** **PRINT** DATA = TEMP (OBS=**10**);

VAR P\_VISITS MUHATI DEVI;

**RUN**;

**DATA** TEMP;

SET TEMP;

ID = \_N\_;

**RUN**;

SYMBOL1 V=DOT I=JOIN C=BLUE H = **.8**;

AXIS1 LABEL=(ANGLE = **90**);

**PROC** **GPLOT** DATA = TEMP;

PLOT DEVI\*ID/ VAXIS = AXIS1;

**RUN**;

**QUIT**;