```
Data final;

set data.scf19922010;

imp=implic;

awgt=nwgt/5;


place=saved;  *replace saved by your dependent variable;

cat=motive1; *replace  by your independent variable category if it has 7 categories – otherwise use code for 6 or 5 or 4 or 3 or 2 groups;

if cat=1 then x1=place;

if cat =2 then x2=place;

if cat =3 then x3=place;

if cat=4 then x4=place;

if cat=5 then x5=place;

if cat=6 then x6=place;

if cat=7 then x7=place;


*Example of RII means tests (code developed by Samuel Chen, 2007);

*for 7 groups ;

PROC SORT DATA=data.final;

BY IMP;

PROC UNIVARIATE DATA=data.final VARDEF=WDF;

 VAR X1 X2 X3 X4 X5 X6 X7;

 WEIGHT awgt;

 BY IMP;

 OUTPUT OUT=RII MEAN=QX1 QX2 QX3 QX4 QX5 QX6 QX7
```

```
        STD=UX1 UX2 UX3 UX4 UX5 UX6 UX7
        N=NX1 NX2 NX3 NX4 NX5 NX6 NX7;

PROC PRINT DATA=RII;

*RII TECHNIQUE FOR A SCALAR;
PROC IML;
  RESET AUTONAME;
  USE RII VAR{QX1 QX2 QX3 QX4 QX5 QX6 QX7}; READ ALL INTO QI;
  USE RII VAR{UX1 UX2 UX3 UX4 UX5 UX6 UX7}; READ ALL INTO UI;
  USE RII VAR{NX1 NX2 NX3 NX4 NX5 NX6 NX7}; READ ALL INTO NI;
  MM= NROW(QI); JMAT = J(MM,1);
  NN= NCOL(QI); NAMES={X1 X2 X3 X4 X5 X6 X7};
*AVERAGE OF THE FIVE POINT ESTIMATES OF THE MEAN (Eq. 1);
  QMBAR=QI(|+,|)/MM;
  QMBAR12=(QI[+,1]-QI[+,2])/MM;
  QMBAR13=(QI[+,1]-QI[+,3])/MM;
  QMBAR14=(QI[+,1]-QI[+,4])/MM;
  QMBAR15=(QI[+,1]-QI[+,5])/MM;
  QMBAR16=(QI[+,1]-QI[+,6])/MM;
  QMBAR17=(QI[+,1]-QI[+,7])/MM;
  QMBAR23=(QI[+,2]-QI[+,3])/MM;
  QMBAR24=(QI[+,2]-QI[+,4])/MM;
  QMBAR25=(QI[+,2]-QI[+,5])/MM;
  QMBAR26=(QI[+,2]-QI[+,6])/MM;
```

```
 QMBAR27=(QI[+,2]-QI[+,7])/MM;
 QMBAR34=(QI[+,3]-QI[+,4])/MM;
 QMBAR35=(QI[+,3]-QI[+,5])/MM;
 QMBAR36=(QI[+,3]-QI[+,6])/MM;
 QMBAR37=(QI[+,3]-QI[+,7])/MM;
 QMBAR45=(QI[+,4]-QI[+,5])/MM;
 QMBAR46=(QI[+,4]-QI[+,6])/MM;
 QMBAR47=(QI[+,4]-QI[+,7])/MM;
 QMBAR56=(QI[+,5]-QI[+,6])/MM;
 QMBAR57=(QI[+,5]-QI[+,7])/MM;
 QMBAR67=(QI[+,6]-QI[+,7])/MM;

*VARIANCE OF THE MEAN (SQUARE OF THE STANDARD ERROR);
 UI=UI#UI;
*AVERAGE WITHIN IMPUTATION VARIANCE (Eq. 2);
 UMBAR1=UI[+,1]/MM;
 UMBAR2=UI[+,2]/MM;
 UMBAR3=UI[+,3]/MM;
 UMBAR4=UI[+,4]/MM;
 UMBAR5=UI[+,5]/MM;
 UMBAR6=UI[+,6]/MM;
 UMBAR7=UI[+,7]/MM;

*INTERMEDIATE STEPS FOR CALCULATING BETWEEN IMPUTATION VARIANCE;
 QMBARX=QMBAR@JMAT;
```

```
  QDIF = QI-QMBARX;

  QDIFSQ = QDIF#QDIF;

*BETWEEN IMPUTATION VARIANCE (Eq. 3);

  BM1 = QDIFSQ[+,1]/(MM-1);

  BM2 = QDIFSQ[+,2]/(MM-1);

  BM3 = QDIFSQ[+,3]/(MM-1);

  BM4 = QDIFSQ[+,4]/(MM-1);

  BM5 = QDIFSQ[+,5]/(MM-1);

  BM6 = QDIFSQ[+,6]/(MM-1);

  BM7 = QDIFSQ[+,7]/(MM-1);


*RII TOTAL VARIANCE OF THE MEAN (Eq. 4);

TM1 = UMBAR1+(1+1/MM)*BM1;

TM2 = UMBAR2+(1+1/MM)*BM2;

TM3 = UMBAR3+(1+1/MM)*BM3;

TM4 = UMBAR4+(1+1/MM)*BM4;

TM5 = UMBAR5+(1+1/MM)*BM5;

TM6 = UMBAR6+(1+1/MM)*BM6;

TM7 = UMBAR7+(1+1/MM)*BM7;


*Pooled standard deviation;

SP12=SQRT(((NI[+,1]-1)*TM1+(NI[+,2]-1)*TM2)/(NI[+,1]+NI[+,2]-2));

SP13=SQRT(((NI[+,1]-1)*TM1+(NI[+,3]-1)*TM3)/(NI[+,1]+NI[+,3]-2));

SP14=SQRT(((NI[+,1]-1)*TM1+(NI[+,4]-1)*TM4)/(NI[+,1]+NI[+,4]-2));

SP15=SQRT(((NI[+,1]-1)*TM1+(NI[+,5]-1)*TM5)/(NI[+,1]+NI[+,5]-2));
```

```
SP16=SQRT(((NI[+,1]-1)*TM1+(NI[+,6]-1)*TM6)/(NI[+,1]+NI[+,6]-2));
SP17=SQRT(((NI[+,1]-1)*TM1+(NI[+,7]-1)*TM7)/(NI[+,1]+NI[+,7]-2));

SP23=SQRT(((NI[+,2]-1)*TM2+(NI[+,3]-1)*TM3)/(NI[+,2]+NI[+,3]-2));
SP24=SQRT(((NI[+,2]-1)*TM2+(NI[+,4]-1)*TM4)/(NI[+,2]+NI[+,4]-2));
SP25=SQRT(((NI[+,2]-1)*TM2+(NI[+,5]-1)*TM5)/(NI[+,2]+NI[+,5]-2));
SP26=SQRT(((NI[+,2]-1)*TM2+(NI[+,6]-1)*TM6)/(NI[+,2]+NI[+,6]-2));
SP27=SQRT(((NI[+,2]-1)*TM2+(NI[+,7]-1)*TM7)/(NI[+,2]+NI[+,7]-2));

SP34=SQRT(((NI[+,3]-1)*TM3+(NI[+,4]-1)*TM4)/(NI[+,3]+NI[+,4]-2));
SP35=SQRT(((NI[+,3]-1)*TM3+(NI[+,5]-1)*TM5)/(NI[+,3]+NI[+,5]-2));
SP36=SQRT(((NI[+,3]-1)*TM3+(NI[+,6]-1)*TM6)/(NI[+,3]+NI[+,6]-2));
SP37=SQRT(((NI[+,3]-1)*TM3+(NI[+,7]-1)*TM7)/(NI[+,3]+NI[+,7]-2));

SP45=SQRT(((NI[+,4]-1)*TM4+(NI[+,5]-1)*TM5)/(NI[+,4]+NI[+,5]-2));
SP46=SQRT(((NI[+,4]-1)*TM4+(NI[+,6]-1)*TM6)/(NI[+,4]+NI[+,6]-2));
SP47=SQRT(((NI[+,4]-1)*TM4+(NI[+,7]-1)*TM7)/(NI[+,4]+NI[+,7]-2));

SP56=SQRT(((NI[+,5]-1)*TM5+(NI[+,6]-1)*TM6)/(NI[+,5]+NI[+,6]-2));
SP57=SQRT(((NI[+,5]-1)*TM5+(NI[+,7]-1)*TM7)/(NI[+,5]+NI[+,7]-2));

SP67=SQRT(((NI[+,6]-1)*TM6+(NI[+,7]-1)*TM7)/(NI[+,6]+NI[+,7]-2));


*Pooled standard error;
```

```
SE12=SP12*SQRT(1/NI[+,1]+1/NI[+,2]);

SE13=SP13*SQRT(1/NI[+,1]+1/NI[+,3]);

SE14=SP14*SQRT(1/NI[+,1]+1/NI[+,4]);

SE15=SP15*SQRT(1/NI[+,1]+1/NI[+,5]);

SE16=SP16*SQRT(1/NI[+,1]+1/NI[+,6]);

SE17=SP17*SQRT(1/NI[+,1]+1/NI[+,7]);


SE23=SP23*SQRT(1/NI[+,2]+1/NI[+,3]);

SE24=SP24*SQRT(1/NI[+,2]+1/NI[+,4]);

SE25=SP25*SQRT(1/NI[+,2]+1/NI[+,5]);

SE26=SP26*SQRT(1/NI[+,2]+1/NI[+,6]);

SE27=SP27*SQRT(1/NI[+,2]+1/NI[+,7]);


SE34=SP34*SQRT(1/NI[+,3]+1/NI[+,4]);

SE35=SP35*SQRT(1/NI[+,3]+1/NI[+,5]);

SE36=SP36*SQRT(1/NI[+,3]+1/NI[+,6]);

SE37=SP37*SQRT(1/NI[+,3]+1/NI[+,7]);


SE45=SP45*SQRT(1/NI[+,4]+1/NI[+,5]);

SE46=SP46*SQRT(1/NI[+,4]+1/NI[+,6]);

SE47=SP47*SQRT(1/NI[+,4]+1/NI[+,7]);


SE56=SP56*SQRT(1/NI[+,5]+1/NI[+,6]);

SE57=SP57*SQRT(1/NI[+,5]+1/NI[+,7]);
```

```
SE67=SP67*SQRT(1/NI[+,6]+1/NI[+,7]);


*T statistic;
T12=QMBAR12/SE12;
T13=QMBAR13/SE13;
T14=QMBAR14/SE14;
T15=QMBAR15/SE15;
T16=QMBAR16/SE16;
T17=QMBAR17/SE17;

T23=QMBAR23/SE23;
T24=QMBAR24/SE24;
T25=QMBAR25/SE25;
T26=QMBAR26/SE26;
T27=QMBAR27/SE27;

T34=QMBAR34/SE34;
T35=QMBAR35/SE35;
T36=QMBAR36/SE36;
T37=QMBAR37/SE37;

T45=QMBAR45/SE45;
T46=QMBAR46/SE46;
T47=QMBAR47/SE47;
```

```
T56=QMBAR56/SE56;

T57=QMBAR57/SE57;


T67=QMBAR67/SE67;


DF12=NI[+,1]+NI[+,2]-2;

DF13=NI[+,1]+NI[+,3]-2;

DF14=NI[+,1]+NI[+,4]-2;

DF15=NI[+,1]+NI[+,5]-2;

DF16=NI[+,1]+NI[+,6]-2;

DF17=NI[+,1]+NI[+,7]-2;


DF23=NI[+,2]+NI[+,3]-2;

DF24=NI[+,2]+NI[+,4]-2;

DF25=NI[+,2]+NI[+,5]-2;

DF26=NI[+,2]+NI[+,6]-2;

DF27=NI[+,2]+NI[+,7]-2;


DF34=NI[+,3]+NI[+,4]-2;

DF35=NI[+,3]+NI[+,5]-2;

DF36=NI[+,3]+NI[+,6]-2;

DF37=NI[+,3]+NI[+,7]-2;


DF45=NI[+,4]+NI[+,5]-2;

DF46=NI[+,4]+NI[+,6]-2;
```

```
DF47=NI[+,4]+NI[+,7]-2;

DF56=NI[+,5]+NI[+,6]-2;

DF57=NI[+,5]+NI[+,7]-2;

DF67=NI[+,6]+NI[+,7]-2;

*P-value;

P12=PROBT(T12,DF12)*2;

if P12>1 then P12=(1-PROBT(T12,DF12))*2;

P13=PROBT(T13,DF13)*2;

if P13>1 then P13=(1-PROBT(T13,DF13))*2;

P14=PROBT(T14,DF14)*2;

if P14>1 then P14=(1-PROBT(T14,DF14))*2;

P15=PROBT(T15,DF15)*2;

if P15>1 then P15=(1-PROBT(T15,DF15))*2;

P16=PROBT(T16,DF16)*2;

if P16>1 then P16=(1-PROBT(T16,DF16))*2;

P17=PROBT(T17,DF17)*2;

if P17>1 then P17=(1-PROBT(T17,DF17))*2;
```

```
P23=PROBT(T23,DF23)*2;
if P23>1 then P23=(1-PROBT(T23,DF23))*2;

P24=PROBT(T24,DF24)*2;
if P24>1 then P24=(1-PROBT(T24,DF24))*2;

P25=PROBT(T25,DF25)*2;
if P25>1 then P25=(1-PROBT(T25,DF25))*2;

P26=PROBT(T26,DF26)*2;
if P26>1 then P26=(1-PROBT(T26,DF26))*2;

P27=PROBT(T27,DF27)*2;
if P27>1 then P27=(1-PROBT(T27,DF27))*2;

P34=PROBT(T34,DF34)*2;
if P34>1 then P34=(1-PROBT(T34,DF34))*2;

P35=PROBT(T35,DF35)*2;
if P35>1 then P35=(1-PROBT(T35,DF35))*2;

P36=PROBT(T36,DF36)*2;
if P36>1 then P36=(1-PROBT(T36,DF36))*2;
```

```
P37=PROBT(T37,DF37)*2;
if P37>1 then P37=(1-PROBT(T37,DF37))*2;

P45=PROBT(T45,DF45)*2;
if P45>1 then P45=(1-PROBT(T45,DF45))*2;

P46=PROBT(T46,DF46)*2;
if P46>1 then P46=(1-PROBT(T46,DF46))*2;

P47=PROBT(T47,DF47)*2;
if P47>1 then P47=(1-PROBT(T47,DF47))*2;

P56=PROBT(T56,DF56)*2;
if P56>1 then P56=(1-PROBT(T56,DF56))*2;

P57=PROBT(T57,DF57)*2;
if P57>1 then P57=(1-PROBT(T57,DF57))*2;

P67=PROBT(T67,DF67)*2;
if P67>1 then P67=(1-PROBT(T67,DF67))*2;



*RII STANDARD ERROR OF THE MEAN (Eq. 5);
  SDTM = SQRT(TM);
*RELATIVE INCREASE IN VARIANCE DUE TO NONRESPONSE (Eq. 8);
```

```
  RM = (1+1/MM)*BM/UMBAR;

*DEGREES OF FREEDOM (Eq. 7);

  VUI = (MM-1)*(1+1/RM)##2;

*FRACTION OF INFORMATION ABOUT PARAMETER Q WHICH IS MISSING (Eq. 9);

  GAMMA =(RM+2/(VUI+3))/(RM+1);

*COMMANDS TO PRINT RESULTS;

PRINT SE12 SE13 SE14 SE15 SE16 SE17 SE23 SE24 SE25 SE26 SE27 SE34 SE35 SE36 SE37 SE45 SE46 SE47
SE56 SE57 SE67;

PRINT T12 T13 T14 T15 T16 T17 T23 T24 T25 T26 T27 T34 T35 T36 T37 T45 T46 T47 T56 T57 T67;

PRINT DF12 DF13 DF14 DF15 DF16 DF17 DF23 DF24 DF25 DF26 DF27 DF34 DF35 DF36 DF37 DF45 DF46
DF47 DF56 DF57 DF67;

PRINT P12 P13 P14 P15 P16 P17 P23 p24 p25 p26 P27 P34 P35 P36 P37 P45 P46 P47 p56 P57 P67;

run;
```