Source statements and examples are presented to compute various statistics based on the regression output from PROC SYSREG. These statistics are on the printed output of PROC SYSREG; however, this code summarizes many pages of regression output into concise tables and graphical displays.

Using the regression coefficients from the OUTEST dataset of PROC SYSREG and the sums of squares from the OUTSSCP dataset, the following statistics are calculated:

- the t statistics associated with the regression coefficients,
- the associated standard errors of the regression coefficients,
- the associated p-values of the t-statistics,
- the R-square of the model, and
- the F value of the model.

Character variables of asterisks are created to indicate significance of the coefficients and the overall F test at the .05 and .01 significance levels ('*' and '**' respectively).

All calculations are performed in PROC MATRIX and the appropriate results are stored in a dataset for later use in printed tables and graphical displays.

Examples presented include a table and graph (using a user written SAS graphics procedure) summarizing growth curve analysis and a table summarizing many regressions based on electricity time-of-use data. SAS statements are given for each example.

EXAMPLE 1 - GROWTH CURVE DATA

```sas
/*GROWTH CURVE PROBLEM. SIMULATE SOME DATA. DATA T, RETAIN A9 19 A1 1 A2 925 89 12.5 61 1.2 62 .885; ARRAY CO(TREAT) A989, ARRAY CI(TREAT) A1 61, ARRAY C2(TREAT) A2 62, DO TREAT=1 TO 2, DO ID=1 TO 3, COF9=+1.25*NORMAL(13), COF1=+.15*NORMAL(0), COF2=+.885*NORMAL(0); DO T=0 TO 12, T2=T*T, Y=COF0+COF1*T+COF2*T2+.75*NORMAL(0); OUTPUT; END; END; KEEP TREAT ID COF0 COF1 COF2 T T2 Y, LABEL Y=Response T=Time; PROC SYSREG NOPRINT OUTEST=ESTS; BY TREAT ID, MODEL Y=T T2; DATA PRED; SET T END=EOF, OUTPUT, KEEP TREAT ID T y, GET ORIGINAL DATA, IF ~EOF THEN RETURN, SET ESTS; SET ESTS END=EOf2, COF0=INTERCEPT, COF1=T, COF2=T2, TREAT=TREAT+2, DO T=0 TO 12 BY .2, GENERATE PREDICTED CURVES, Y=COF0+COF1*T+COF2*T2, OUTPUT; END; IF ~EOF2 THEN GO TO GETEST, PROC GRAPH NOCLOSE NX=600; GRAPH T Y, CLASS TREAT, SUBCLASS ID; PUT 'Growth Curve Example' Y=4.5; KEY 1 TEXT='Treatment 1' CHAR=X LINE=0 COLOR=RED X=1.1 Y=3.6; KEY 2 LINE=0 COLOR=BLUE; KEY 3 TEXT='Treatment 2' CHAR=X LINE=0 LSW=.026 COLOR=RED X=1.1; KEY 4 LINE=6 LSW=.826 COLOR=BLUE; PUT 'Predicted in Blue' X=1.1; Figure 1.1-Sysreg and Graphical Presentation of Growth Curve Data
```
Growth Curve Example

![Growth Curve Example](image)

Figure 1.2 Table of Growth Curve Analysis

<table>
<thead>
<tr>
<th>Treatment</th>
<th>ID</th>
<th>Intercept</th>
<th>Coefficient of T</th>
<th>Coefficient of T^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>10.433</td>
<td>1.086</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>11.415</td>
<td>1.252</td>
<td>-0.083</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>12.339</td>
<td>1.324</td>
<td>-0.083</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>12.339</td>
<td>0.834</td>
<td>0.122</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>13.739</td>
<td>1.215</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>13.936</td>
<td>1.388</td>
<td>0.073</td>
</tr>
</tbody>
</table>

Figure 1.2 Table of Growth Curve Analysis
EXAMPLE 2-ELECTRICITY TIME-OF-USE DATA

OPTIONS BLKSIZE=2048 NONUMBER NODATE;
PROC SYRES NOPOST OUTTEST=OUTTEST OUTSSCP=OUTSSCP;
MODEL Y1-Y32=TAU LPHTLS HHW DRY WASH RANGE LFREZ LSQFEET LINCONE;
MACRO KEEP VARS INTERCEP TAU LPHTLS HHW DRY WASH RANGE LFREZ LSQFEET LINCONE % MACRO TO DEFINE VARIABLES IN KEEP;
DATA NAME(KEEP=FCOL TCOL SCOL); * VARIABLE NAME DATASET;
INPUT COL ;
IF COL='INTERCEP' THEN COL='INT'; * VARIABLE NAME ONLY 8 CHARACTERS LONG;
FCOL='P'/TCOL='T'/TCOL='S'/TCOL;
CARDS;
INTERCEP TAU LPHTLS HHW DRY WASH RANGE LFREZ LSQFEET LINCONE
PROC MATRIX;

*DEFINE BETA COEFFICIENTS, SUMS OF SQUARES, DEGREES OF FREEDOM, T VALUES, F VALUES, P VALUES AND STANDARD ERRORS;
FETCH EST DATA=ESTOUT KEEP=KEEPVARS_SIGMA_; *SYSREG ESTIMATES;
NDEP=NROW(ESTO);
NIND=NCOL(ESTO)-1;
NTOT=NIND+NDEP;
FETCH SSCP DATA=SSCPOUT COLNAME=VNAME;
	*SUMS OF SQUARES AND CROSS PRODUCTS;
BETA=ESTC1:NDEP,1:NIND);
SIGMA=ESTC1:NDEP,NIND+1);
EDF=SSCPC1,1)- NIND;
RDF=NIND-1;
SSE=SSCPC1,1) N SSCPC1,NDEP+2,NTOT);
SST=VECDIAGCSSCPC2:NDEP+1,2:NDEP+1)-;
FREE XSS; SE=SQRT<VECDIAGCINVXSSC1,N>II XSSCPC2,NTOT,NTOT);
FREE XSS SE;
SNAME=VNAME<*,S>jIFNAME, RNAME='R$OUARE' 'FVALUE' 'PROBF', CNAME=TNAME'IIPNAME'!!RFP; 

*DEFINE ASTERISKS TO INDICATE SIGNIFICANCE OF T VALUES AND F VALUES;
TSTAR='*'(PVALT>.05) +'*'(PVALT<=.05&PVAF<=.01) +'*'(PVALT<=.01);
FSTAR='**'(PVALF>.05) +'*'(PVALF<=.05&PVALF<=.01) +'*'(PVALF<=.01); 
STAR=TSTAIRFSTAR; *CHARACTER ASTERISKS MATRIX;

*NAME VARIABLES FOR OUTPUTTING MATRICES;
FETCH VARNAMe DATA=VNAME TYPE=CHAR;
PNAME=VNAME<*,12j;
TNAME=VNAME<*,23j;
FNAME='FSTAR';
SNAME=VNAME<*,3jIIPNAME;
RNAME='RSQURE' 'FVALUE' 'PROBF';
CNAME=TNAME'IIPNAME'IIPRFP;

*OUTPUT MATRICES FOR FORMATTED TABLES;
OUTPUT TRFP OUT=TRFP COLNAME=CNAME; *NUMERIC VARIABLES DATASET;
OUTPUT STAR OUT=STAR TYPE=CHAR COLNAME=SNAME; *CHARACTER VARIABLES DATA SET;

Figure 2.1, MATRIX statements
**FORMAT TABLES HAVING REGRESSION COEFFICIENTS, R-SQUARE, F-VALUES,**
**AND ASTERISKS TO INDICATE SIGNIFICANT COEFFICIENTS;**
**MACRO SMOKE LOCAL STATUE SLIDE'S HIND SDRY SHASH ORANGE SLFREZ**
**SLSFREET SLINCOME % MACRO FOR ASTERISK NAMES;**
**DATA _NULL_; MERGE EST.MOD1(KEEP=KEEPFARS)
TRFPC(KEEP=R-SQUARE FVALUE)
STARK(KEEP=SMODEL 1PSTAR) END=EOF;**

**FILE PRINT HEADER=*,**
**MACRO REST 01 TIME $CHAR32. #20**
**SLFREZ SLSFREET LSOFEET SLINCOME SLINCOME R-SQUARE FVALUE**
**FSTAR**

C6.3 $2. 7.3 $2. 7.3 $2. 7.3 $2. 7.3 $2. $2.3 $2. $2.3

**IF N =1 OR N = 6 OR N =13 OR N =18 OR N =21 OR N =24 OR N =25**

**THEN PUT 01 74"'-"**;

**LENGTH TIME = 30;**

**IF N =1 THEN TIME=" 12pm - 1am Base"**

**IF N =2 THEN TIME=" 1am - 2am"**

**IF N =3 THEN TIME=" 2am - 3am"**

**IF N =4 THEN TIME=" 3am - 4am"**

**IF N =5 THEN TIME=" 4am - 5am"**

**IF N =6 THEN TIME=" 5am - 6am"**

**IF N =7 THEN TIME=" 6am - 7am"**

**IF N =8 THEN TIME=" 7am - 8am Peak1"**

**IF N =9 THEN TIME=" 8am - 9am"**

**IF N =10 THEN TIME=" 9am - 10am"**

**IF N =11 THEN TIME=" 10am - 11am"**

**IF N =12 THEN TIME=" 11am - 12am"**

**IF N =13 THEN TIME=" 12am - 1pm Intermed1"**

**IF N =14 THEN TIME=" 1pm - 2pm"**

**IF N =15 THEN TIME=" 2pm - 3pm"**

**IF N =16 THEN TIME=" 3pm - 4pm"**

**IF N =17 THEN TIME=" 4pm - 5pm"**

**IF N =18 THEN TIME=" 5pm - 6pm Peak2"**

**IF N =19 THEN TIME=" 6pm - 7pm"**

**IF N =20 THEN TIME=" 7pm - 8pm"**

**IF N =21 THEN TIME=" 8pm - 9pm Intermed2"**

**IF N =22 THEN TIME=" 9pm - 10pm"**

**IF N =23 THEN TIME=" 10pm - 11pm"**

**IF N =24 THEN TIME=" 11pm - 12pm Base"**

**IF N =25 THEN TIME=" 12am - 1pm Peak1"**

**IF N =26 THEN TIME=" 1pm - 2pm Peak2"**

**IF N =27 THEN TIME=" 2pm - 3pm Intermed1"**

**IF N =28 THEN TIME=" 3pm - 4pm Intermed2"**

**IF N =29 THEN TIME=" 4pm - 5pm Peak Hours"**

**IF N =30 THEN TIME=" 5pm - 6pm Intermed Hours"**

**IF N =31 THEN TIME=" 6pm - 7pm Base Hours"**

**IF N =32 THEN TIME=" 7pm - 8pm All Hours"**

**IF N 26 OR N = 26 OR N = 28 OR N = 30 OR N = 31 THEN PUT REST;**

**IF N =25 OR N =27 OR N =29 THEN PUT / REST;**

**IF N =32 THEN PUT // REST;**

**IF EOF THEN PUT 01 74"'-"**;

**RETURN;**

**H:PUT // "11 ESTIMATED REGRESSION COEFFICIENTS FOR"**

**PUT 06 'ALL CUSTOMERS ON AVERAGE FEBRUARY DAY;MODEL I';**

**PUT / 01 74"'-"**;

**PUT 'TIME OF USE';**

**05 'PERIOD';**

**038 'SLFREZ' 039 'LSOFEET' 048 'SLINCOME' 057 'R-SQUARE';**

**066 'F-VALUE';**

?
<table>
<thead>
<tr>
<th>TIME OF USE</th>
<th>PERIOD</th>
<th>LFREZ</th>
<th>LSQFEET</th>
<th>LINCOME</th>
<th>R-SQUARE</th>
<th>F-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12pm - 1am</td>
<td>Base</td>
<td>0.052</td>
<td>0.190</td>
<td>0.214</td>
<td>0.651</td>
<td>28.107**</td>
</tr>
<tr>
<td>1am - 2am</td>
<td></td>
<td>0.034</td>
<td>0.107</td>
<td>0.173</td>
<td>0.866</td>
<td>38.012**</td>
</tr>
<tr>
<td>2am - 3am</td>
<td></td>
<td>0.020</td>
<td>0.063</td>
<td>0.254</td>
<td>0.659</td>
<td>20.199**</td>
</tr>
<tr>
<td>3am - 4am</td>
<td></td>
<td>-0.071</td>
<td>0.069</td>
<td>0.248</td>
<td>0.673</td>
<td>31.087**</td>
</tr>
<tr>
<td>4am - 5am</td>
<td></td>
<td>-0.084</td>
<td>0.152</td>
<td>0.181</td>
<td>0.624</td>
<td>25.069**</td>
</tr>
<tr>
<td>5am - 6am</td>
<td></td>
<td>0.129</td>
<td>0.010</td>
<td>0.268</td>
<td>0.693</td>
<td>25.824**</td>
</tr>
<tr>
<td>6am - 7am</td>
<td></td>
<td>0.225</td>
<td>-0.017</td>
<td>0.274</td>
<td>0.625</td>
<td>25.114**</td>
</tr>
<tr>
<td>7am - 8am</td>
<td>Peak1</td>
<td>-0.087</td>
<td>0.187</td>
<td>0.245</td>
<td>0.621</td>
<td>24.717**</td>
</tr>
<tr>
<td>8am - 9am</td>
<td></td>
<td>-0.226</td>
<td>0.370</td>
<td>0.262</td>
<td>0.577</td>
<td>20.588**</td>
</tr>
<tr>
<td>9am - 10am</td>
<td></td>
<td>-0.203</td>
<td>0.360</td>
<td>0.187</td>
<td>0.532</td>
<td>17.183**</td>
</tr>
<tr>
<td>10am - 11am</td>
<td></td>
<td>-0.161</td>
<td>0.363</td>
<td>0.132</td>
<td>0.564</td>
<td>19.526**</td>
</tr>
<tr>
<td>11am - 12am</td>
<td></td>
<td>-0.094</td>
<td>0.523</td>
<td>0.015</td>
<td>0.588</td>
<td>21.359**</td>
</tr>
<tr>
<td>12am - 1pm</td>
<td>Intermed1</td>
<td>0.086</td>
<td>0.403</td>
<td>-0.047</td>
<td>0.628</td>
<td>25.509**</td>
</tr>
<tr>
<td>1pm - 2pm</td>
<td></td>
<td>0.098</td>
<td>0.300</td>
<td>0.013</td>
<td>0.623</td>
<td>24.933**</td>
</tr>
<tr>
<td>2pm - 3pm</td>
<td></td>
<td>0.008</td>
<td>0.317</td>
<td>0.034</td>
<td>0.620</td>
<td>24.627**</td>
</tr>
<tr>
<td>3pm - 4pm</td>
<td></td>
<td>-0.033</td>
<td>0.221</td>
<td>0.077</td>
<td>0.575</td>
<td>20.388**</td>
</tr>
<tr>
<td>4pm - 5pm</td>
<td></td>
<td>-0.067</td>
<td>0.126</td>
<td>0.059</td>
<td>0.599</td>
<td>15.845**</td>
</tr>
<tr>
<td>5pm - 6pm</td>
<td>Peak2</td>
<td>0.002</td>
<td>0.839</td>
<td>0.125</td>
<td>0.581</td>
<td>19.397**</td>
</tr>
<tr>
<td>6pm - 7pm</td>
<td></td>
<td>-0.059</td>
<td>0.065</td>
<td>0.189</td>
<td>0.596</td>
<td>22.253**</td>
</tr>
<tr>
<td>7pm - 8pm</td>
<td></td>
<td>-0.011</td>
<td>-0.028</td>
<td>0.255</td>
<td>0.669</td>
<td>20.125**</td>
</tr>
<tr>
<td>8pm - 9pm</td>
<td>Intermed2</td>
<td>-0.031</td>
<td>0.092</td>
<td>0.123</td>
<td>0.635</td>
<td>34.978**</td>
</tr>
<tr>
<td>9pm - 10pm</td>
<td></td>
<td>-0.081</td>
<td>0.085</td>
<td>0.221</td>
<td>0.666</td>
<td>39.012**</td>
</tr>
<tr>
<td>10pm - 11pm</td>
<td></td>
<td>-0.073</td>
<td>0.065</td>
<td>0.201</td>
<td>0.677</td>
<td>31.501**</td>
</tr>
<tr>
<td>11pm - 12pm</td>
<td>Base</td>
<td>-0.051</td>
<td>0.129</td>
<td>0.161</td>
<td>0.675</td>
<td>31.335**</td>
</tr>
<tr>
<td>12am - 1am</td>
<td>Peak1</td>
<td>-0.142</td>
<td>0.557</td>
<td>0.141</td>
<td>0.687</td>
<td>23.313**</td>
</tr>
<tr>
<td>1pm - 2pm</td>
<td>Peak2</td>
<td>-0.021</td>
<td>0.221</td>
<td>0.194</td>
<td>0.626</td>
<td>25.252**</td>
</tr>
<tr>
<td>2pm - 3pm</td>
<td>Intermed1</td>
<td>-0.029</td>
<td>0.263</td>
<td>0.262</td>
<td>0.627</td>
<td>25.378**</td>
</tr>
<tr>
<td>3pm - 4pm</td>
<td>Intermed2</td>
<td>-0.080</td>
<td>0.448</td>
<td>0.230</td>
<td>0.719</td>
<td>38.559**</td>
</tr>
<tr>
<td>4pm - 5pm</td>
<td>Peak Hours</td>
<td>-0.160</td>
<td>0.141</td>
<td>0.157</td>
<td>0.692</td>
<td>23.183**</td>
</tr>
<tr>
<td>5pm - 6pm</td>
<td>Intermed Hours</td>
<td>-0.397</td>
<td>0.158</td>
<td>0.119</td>
<td>0.696</td>
<td>34.375**</td>
</tr>
<tr>
<td>6pm - 7pm</td>
<td>Base Hours</td>
<td>0.075</td>
<td>0.060</td>
<td>0.195</td>
<td>0.715</td>
<td>37.863**</td>
</tr>
<tr>
<td>7pm - 8pm</td>
<td>All Hours</td>
<td>-0.038</td>
<td>0.137</td>
<td>0.147</td>
<td>0.713</td>
<td>37.494**</td>
</tr>
</tbody>
</table>

Figure 2.2. Table of Regression Results of Electricity