



Steps to Success with the SAS® Output Delivery System (ODS)



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Steps to Success with the SAS Output Delivery System

- Beginning Tutorial
- Introduce Key Concepts and Capabilities of the SAS Output Delivery System
- Show Ways to Get Things Done
 - Faster
 - Quicker
 - Easier
 - Better
 - With ODS

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Steps to Success with the SAS Output Delivery System

- What We Will Discuss:
 - How ODS “works” and its role in SAS System Software
 - Relationship Between SAS Procedure Steps and ODS
 - Data Component, Table Template, Style Template
 - ODS Destinations
 - PDF, RTF, OUTPUT, CSV, etc.
 - ODS Style Statement
 - PROCs PRINT, REPORT and TABULATE

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Steps to Success with the SAS Output Delivery System

- At the End of This Presentation You Will
 - **Understand** Core Parts of How ODS Operates within the SAS System
 - **Know** How to Open/Close ODS Destinations
 - **Select** Output Objects for “Delivery” to Destinations
 - **Select** a Style Template to Control Output Appearance
 - **Use** an ODS Style Statement in PROC REPORT to “Traffic-Light” Your Output

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Challenges Faced by SAS Users

➤ How can we.....

- “Easily” combine the ‘important’ parts of the results from multiple “runs” of SAS Procedure Steps in to a single table that summarizes our findings and which we can easily display in a report or paper?
- “Easily” control the appearance of our report based on the values of data IN the report?
- Share our results with others?
 - Solution: **ODS**

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SAS Output Delivery System (ODS)

- Added to BASE SAS Software in Version 8
- Process by which the SAS System “**delivers**” output to “**destinations**”
- **Completely revolutionized** way that SAS users work with Procedure-generated output
- **Provides complete control** over what is being generated, where it is “delivered” and what it looks like.

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SAS Output Delivery System (ODS)

> Why You Should Learn About ODS:

- **Create SAS-generated output** as PDF, RTF, HTML, CSV or other files, including SAS data sets
- **Control the appearance** of output using Style Templates
- **Combine output** from multiple “PROC steps” in to one customized report
- Facilitate generation of “final report” **without tedious re-typing, cutting and pasting**, or use of “PROC HIGHLIGHTER” or “PROC CUT and PASTE”
- **Share SAS Output** with Others

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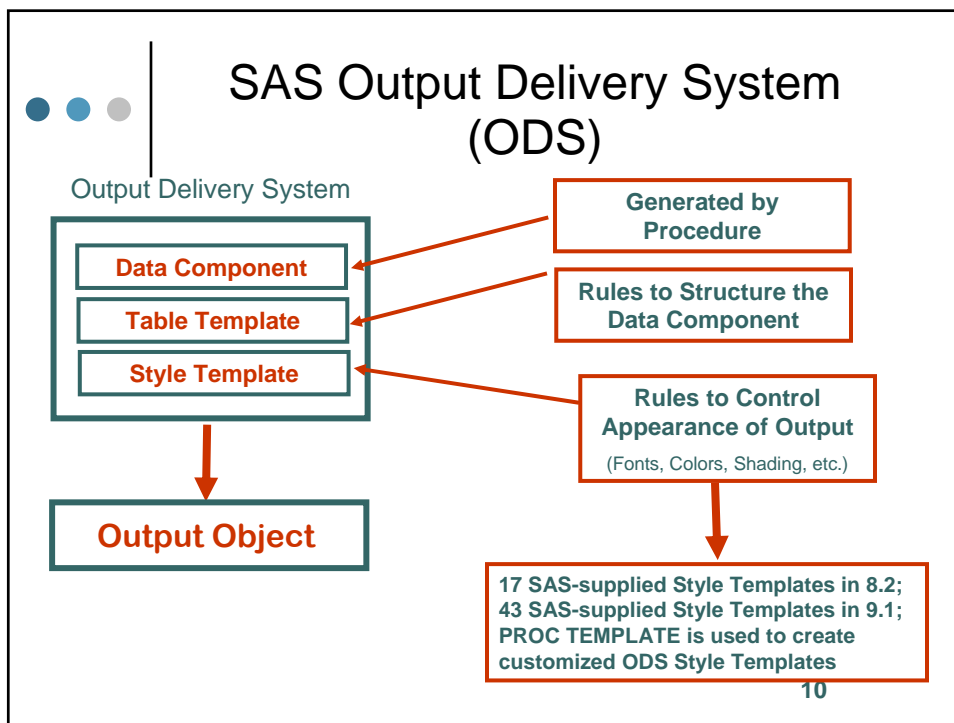
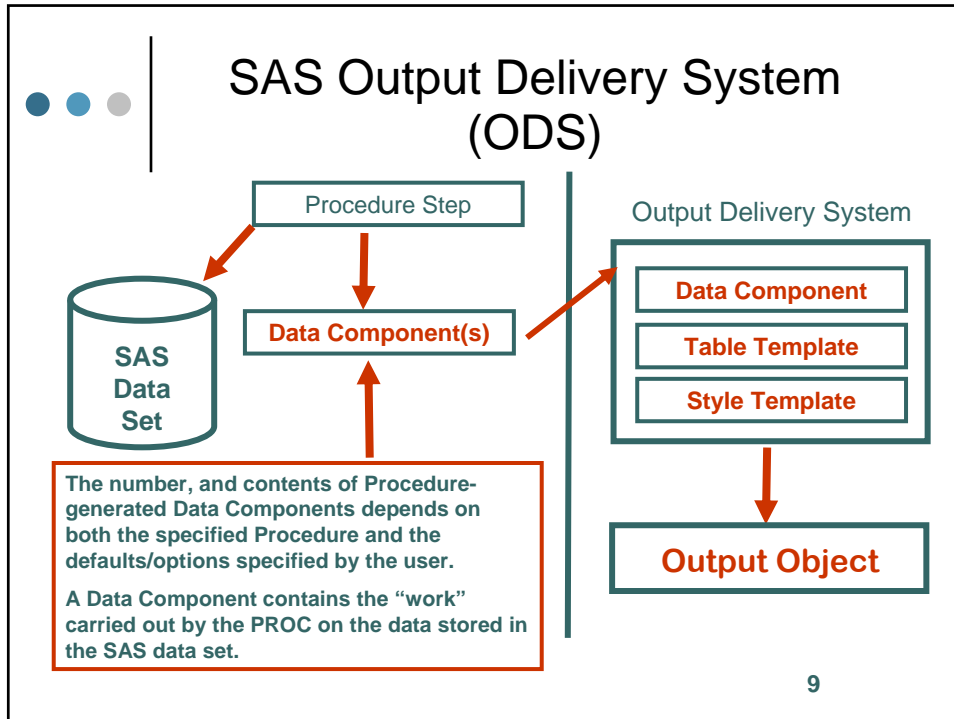


SAS Output Delivery System (ODS)

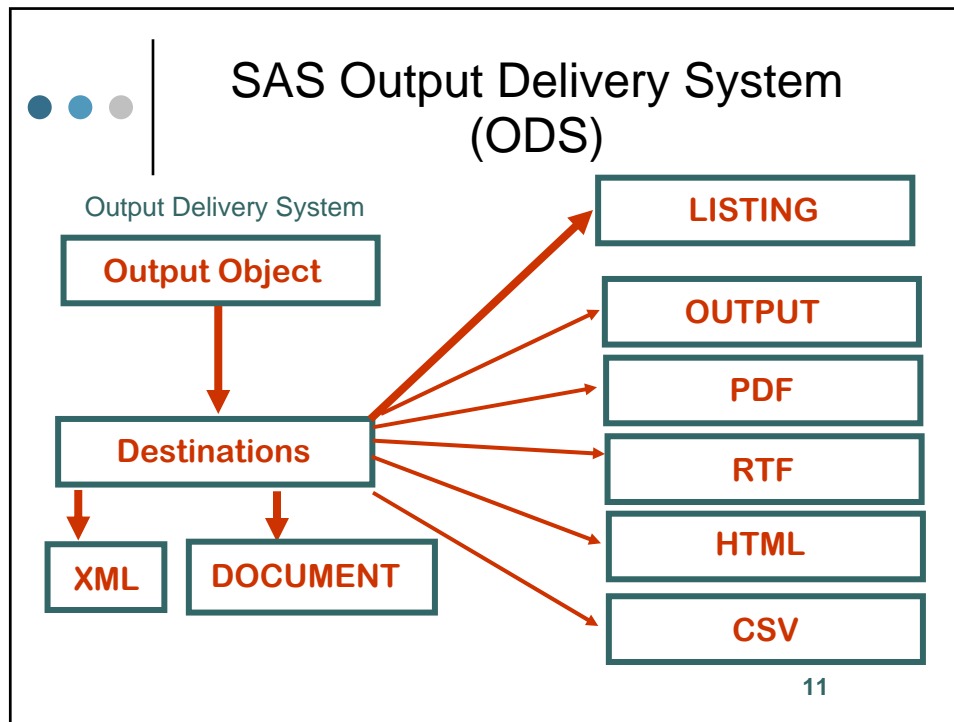
> How it works:

- Procedure carries out the work/tasks specified in the PROC “step” or those which it carries out by default.
- Procedure generates one or more “**data components**” and “passes” them to the ODS.
- ODS binds the each data component to a **table component**, consisting of a **style template** and a **table template**, resulting in an **output object**.
- **Object** is then “**delivered**” to all currently **open “destinations”**

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The ODS OUTPUT Destination

- **Problem:** Analyst needs to run four separate ANOVA (Analysis of Variance) models to assess job satisfaction measures in a survey administered to officers assigned to ten Detachments of the Royal Canadian Mounted Police (RCMP) in Alberta Province.
 - Goal is to take the “important” pieces of the PROC GLM-generated output and combine them in to one table for inclusion in a report.

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Approach

- Run separate linear models (ANOVAs) on each of the four measures.

```

143 * run four separate one-day anovas;
144 proc glm data=dnsc276.rcmp;
145 class detachment;
146 * note list-addressing of variables w/common prefix;
147 model satf1 - satf4 = detachment;
148 title5 'One Way Anovas for Each Job Satisfaction Measure';
149 quit;

```

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Four One-Way ANOVAs: I

GWU School of Business
 Decision Science 276: Exploratory and Multivariate Data Analysis
 Lecture 4: Fall 2007 Semester
 Introduction to Multivariate Analysis
 One Way Anovas for Each Job Satisfaction Measure

The GLM Procedure

Dependent Variable: SATF1 Satisfaction With Job Characteristics

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|----|----------------|-------------|---------|--------|
| Model | 9 | 6.33919973 | 0.70435553 | 2.05 | 0.0428 |
| Error | 86 | 29.50080027 | 0.34303256 | | |
| Corrected Total | 95 | 35.84000000 | | | |

| R-Square | Coeff Var | Root MSE | SATF1 Mean |
|----------|-----------|----------|------------|
| 0.176875 | 16.04630 | 0.585690 | 3.650000 |

| Source | DF | Type I SS | Mean Square | F Value | Pr > F |
|------------|----|------------|-------------|---------|--------|
| DETACHMENT | 9 | 6.33919973 | 0.70435553 | 2.05 | 0.0428 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|------------|----|-------------|-------------|---------|--------|
| DETACHMENT | 9 | 6.33919973 | 0.70435553 | 2.05 | 0.0428 |



Four One-Way ANOVAs: II

```
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Lecture 4: Fall 2007 Semester
Introduction to Multivariate Analysis
One Way Anovas for Each Job Satisfaction Measure

The GLM Procedure
Dependent Variable: SATF2 Satisfaction With Salary and Benefits
```

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|----|----------------|-------------|---------|--------|
| Model | 9 | 4.35528003 | 0.48392000 | 0.92 | 0.5131 |
| Error | 86 | 45.30096997 | 0.52675546 | | |
| Corrected Total | 95 | 49.65625000 | | | |

| R-Square | Coeff Var | Root MSE | SATF2 Mean |
|----------|-----------|----------|------------|
| 0.087709 | 19.85037 | 0.725779 | 3.656250 |

| Source | DF | Type I SS | Mean Square | F Value | Pr > F |
|------------|----|------------|-------------|---------|--------|
| DETACHMENT | 9 | 4.35528003 | 0.48392000 | 0.92 | 0.5131 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|------------|----|-------------|-------------|---------|--------|
| DETACHMENT | 9 | 4.35528003 | 0.48392000 | 0.92 | 0.5131 |



Four One-Way ANOVAs: III

```
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Lecture 4: Fall 2007 Semester
Introduction to Multivariate Analysis
One Way Anovas for Each Job Satisfaction Measure

The GLM Procedure
Dependent Variable: SATF3 Satisfaction With Commanding Officer
```

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|----|----------------|-------------|---------|--------|
| Model | 9 | 54.1874044 | 6.0208227 | 7.42 | <.0001 |
| Error | 86 | 69.7709289 | 0.8112899 | | |
| Corrected Total | 95 | 123.9583333 | | | |

| R-Square | Coeff Var | Root MSE | SATF3 Mean |
|----------|-----------|----------|------------|
| 0.437142 | 22.63580 | 0.900716 | 3.979167 |

| Source | DF | Type I SS | Mean Square | F Value | Pr > F |
|------------|----|------------|-------------|---------|--------|
| DETACHMENT | 9 | 54.1874044 | 6.0208227 | 7.42 | <.0001 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|------------|----|-------------|-------------|---------|--------|
| DETACHMENT | 9 | 54.1874044 | 6.0208227 | 7.42 | <.0001 |



Four One-Way ANOVAs: IV

```
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Lecture 4: Fall 2007 Semester
Introduction to Multivariate Analysis
One Way Anovas for Each Job Satisfaction Measure

The GLM Procedure

Dependent Variable: SATF4 Satisfaction with Co-Workers
```

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|----|----------------|-------------|---------|--------|
| Model | 9 | 4.43600709 | 0.49288968 | 0.99 | 0.4541 |
| Error | 86 | 42.80357625 | 0.49771600 | | |
| Corrected Total | 95 | 47.23958333 | | | |

| R-Square | Coeff Var | Root MSE | SATF4 Mean |
|-----------|-----------|----------|------------|
| 0.0933904 | 16.80571 | 0.705490 | 4.197917 |

| Source | DF | Type I SS | Mean Square | F Value | Pr > F |
|------------|----|------------|-------------|---------|--------|
| DETACHMENT | 9 | 4.43600709 | 0.49288968 | 0.99 | 0.4541 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|------------|----|-------------|-------------|---------|--------|
| DETACHMENT | 9 | 4.43600709 | 0.49288968 | 0.99 | 0.4541 |

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Example: Combining Output from Multiple Procedure “Runs” Using ODS and the OUTPUT Destination

- **Goal:** Take the “important” pieces of the four one-way ANOVA output in the Output Window and combine them in to a single table that can be introduced in to a report.
- **Solution: ODS Output Destination**
 - Saves Output Objects as Permanent or Temporary SAS Data Sets
 - Useful way to “capture” output from multiple analytic procedure “runs”

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● ● ● Learning ODS Table Names

- ODS Tables (or Objects) have names corresponding to the contents of the table
- Table names ARE NOT unique to a single Procedures
 - Multiple procedures can generate a “Parameter Estimates” or “Fit Statistics” table, for example
 - Procedure Documentation
 - ODS TRACE ON/LISTING;
 - ODS TRACE OFF;

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● ● ● Learning ODS Table Names

```
152 * find ODS table names;  
153 ods trace on/listing; ←  
154 proc glm data=dnsc276.rcmp;  
155 class detachment;  
156 model satf1 = detachment;  
157 title 'Find ODS Table Names';  
158 quit;  
159 ods trace off; ←
```

ODS TRACE ON/LISTING statement directs SAS to write ODS table names in to the LISTING Destination (the Output Window) immediately before the table itself. Remains in effect until you submit ODS TRACE OFF.

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Learning ODS Table Names

The screenshot shows the SAS 9.1.3 Help and Documentation interface. On the left is the welcome page. On the right is the 'The FREQ Procedure' details page. A red arrow points to the 'Details' section in the table of contents, and another red arrow points to the 'ODS Table Names' link in the right-hand pane.

Learning ODS Table Names

The screenshot shows the 'The FREQ Procedure' ODS Table Names section. A red box highlights the title 'The FREQ Procedure' and a red arrow points to the table below.

ODS Table Names

PROC FREQ assigns a name to each table it creates. You can use these names to reference the table when using the Output Delivery System (ODS) to select tables and create output data sets. For more information on ODS, see Chapter 14, "Using the Output Delivery System."

Table 29.11 lists the ODS table names together with their descriptions and the options required to produce the tables. Note that the ALL option in the TABLES statement invokes the CHISQ, MEASURES, and CMH options.

Table 29.11: ODS Tables Produced in PROC FREQ

| ODS Table Name | Description | Statement | Option |
|---------------------|---|-----------|------------------------------------|
| BinomialProp | Binomial proportion | TABLES | BINOMIAL (one-way tables) |
| BinomialPropTest | Binomial proportion test | TABLES | BINOMIAL (one-way tables) |
| BreslowDayTest | Breslow-Day test | TABLES | CMH (I _x ×2×2 tables) |
| CMH | Cochran-Mantel-Haenszel statistics | TABLES | CMH |
| ChiSq | Chi-square tests | TABLES | CHISQ |
| CochransQ | Cochran's Q | TABLES | AGREE (I _x ×2×2 tables) |
| ColScores | Column scores | TABLES | SCOROUT |
| CommonOddsRatioCL | Exact confidence limits for the common odds ratio | EXACT | COMOR |
| CommonOddsRatioTest | Common odds ratio exact test | EXACT | COMOR |
| CommonRelRisks | Common relative risks | TABLES | CMH (I _x ×2×2 tables) |
| CrossList | Column format | TABLES | CROSSLIST |



Learning ODS Table Names

```
Find ODS Table Names
The GLM Procedure
Dependent Variable: SATFI Satisfaction With Job Characteristics

Output Added:
-----
Name: OverallANOVA
Label: Overall ANOVA
Template: stat.GLM.OverallANOVA
Path: OLM.ANOVA.SATFI.OverallANOVA

Source          DF          Sum of Squares    Mean Square    F Value    Pr > F
Model            9          6.33919973          0.70435553      2.05      0.0428
Error           86          29.50080027          0.34303256
Corrected Total  95          35.84000000

Output Added:
-----
Name: FitStatistics
Label: Fit Statistics
Template: stat.GLM.FitStatistics
Path: OLM.ANOVA.SATFI.FitStatistics

R-Square      Coeff Var      Root MSE      SATFI Mean
0.176875      16.04630      0.585599      3.660000

Output Added:
-----
Name: ModelANOVA
Label: Type I Model ANOVA
Template: stat.GLM.Tests
Path: OLM.ANOVA.SATFI.ModelANOVA

Source          DF          Type I SS    Mean Square    F Value    Pr > F
DETACHMENT      9          6.33919973    0.70435553      2.05      0.0428

Output Added:
-----
Name: ModelANOVA
Label: Type III Model ANOVA
Template: stat.GLM.Tests
Path: OLM.ANOVA.SATFI.ModelANOVA
```



Using the ODS OUTPUT Destination

► Task:

- Re-run PROC GLM, but do NOT send output to the Output Window
- Capture the Contents of the
 - MODELANOVA
 - FITSTATISTICS tables as SAS Data Sets
- Re-Open Listing Destination at End of PROC GLM Step

Using the ODS OUTPUT Destination

```

160
161 ods listing close; * <<< stop sending output to LISTING destination;
162 ods output modelanova=modelanova1(where=(hypothesistype = 1));
163 ods output fitstatistics = fit;
164 proc glm data=dnsc276.rcmp;
165 class detachment;
166 model satf1-satf4 = detachment;
167 quit;
168 ods listing; * <<< start sending output to LISTING destination;
  
```

PROC GLM carries out the specified analyses, but no output is “delivered” to the LISTING destination (i.e., the Output Window).

Instead, the contents of the MODELANOVA and FITSTATISTICS tables are “delivered” via the OUTPUT destination to temporary SAS data sets. A WHERE Clause SAS Data Set option is used to limit the output of rows/observations by ODS to Data Set MODELANOVA1 to just those containing the TYPE I Sums of Squares Analysis.

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Using the ODS Output Destination

| Obs | Dependent | Hypothesis Type | Source | DF | SS | MS | FValue |
|-----|-----------|-----------------|------------|----|-------------|------------|--------|
| 1 | SATF1 | 1 | DETACHMENT | 9 | 6.33919973 | 0.70435553 | 2.05 |
| 2 | SATF2 | 1 | DETACHMENT | 9 | 4.35528003 | 0.48392000 | 0.92 |
| 3 | SATF3 | 1 | DETACHMENT | 9 | 54.18740441 | 6.02082271 | 7.42 |
| 4 | SATF4 | 1 | DETACHMENT | 9 | 4.43600709 | 0.49288968 | 0.99 |

| Obs | Dependent | RSquare | CV | RootMSE | DepMean |
|-----|-----------|----------|----------|----------|----------|
| 1 | SATF1 | 0.176875 | 16.04630 | 0.585690 | 3.650000 |
| 2 | SATF2 | 0.087709 | 19.85037 | 0.725779 | 3.656250 |
| 3 | SATF3 | 0.437142 | 22.63580 | 0.900716 | 3.979167 |
| 4 | SATF4 | 0.093904 | 16.80571 | 0.705490 | 4.197917 |

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Using the ODS OUTPUT Destination

- Now, it becomes a relatively simple matter to join these two data sets into one data set that contains just the variables/columns that I need for my report.

```
178=proc sort data=modelanova1;
179 by dependent;
180 run;
181
182=proc sort data=fit;
183 by dependent;
184 run;
185
186= data combine(keep = dependent source df fvalue probf rsquare depmean);
187 merge modelanova1 fit;
188 by dependent;
189 label dependent = 'Name of Dependent Variable'
190 source = 'Name of Independent Variable'
191 df = 'Degrees of Freedom'
192 probf = 'Probability Value'
193 tvalue = 'F-Statistic Value'
194 rsquare = 'R Square'
195 depmean = 'Dependent Variable Mean';
196 run;
```

Using the ODS OUTPUT Destination

```
198=proc format;
199 * assign format labels to dependent variable names;
200 * note: dollar sign ($) precedes name of format associated to;
201 * values of character variables;
202 value $depvarf SATF1 = 'Satis. w/Job'
203 SATF2 = 'Satis. w/Salary & Benefits'
204 SATF3 = 'Satis. w/Command. Offcr.'
205 SATF4 = 'Satis. w/Co-Workers';
206 * assign colors to p-values;
207 value pvalf low - .0299999999 = 'green'
208 .03 -< .0999999999 = 'blue'
209 .10 - high = 'red';
210 run;
211
212=proc print data=combine label;
213 format dependent $depvarf.;
214 title5 'Combining ODS Objects in to One SAS Data Set';
215 run;
```



Using the ODS OUTPUT Destination

```
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Lecture 4: Fall 2007 Semester
Introduction to Multivariate Analysis
Combining ODS Objects in to One SAS Data Set
```

| Obs | Name of Dependent Variable | Name of Independent Variable | Degrees of Freedom | F-Statistic Value | Probability Value | R Square | Dependent Variable Mean |
|-----|----------------------------|------------------------------|--------------------|-------------------|-------------------|----------|-------------------------|
| 1 | Satis. w/Job | DETACHMENT | 9 | 2.95 | 0.0428 | 0.176875 | 3.650000 |
| 2 | Satis. w/Salary & Benefits | DETACHMENT | 9 | 0.92 | 0.5131 | 0.087709 | 3.656250 |
| 3 | Satis. w/Command. Offcer. | DETACHMENT | 9 | 7.42 | 0.0061 | 0.437142 | 3.979167 |
| 4 | Satis. w/Co-Workers | DETACHMENT | 9 | 0.39 | 0.4541 | 0.033504 | 4.197917 |

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Recap: Output Destination

- Allows you to “save” Procedure-generated Data Components as SAS data sets
- Useful to select the “pieces” of your Procedure output that you need to combine/modify/join in to a single report or table.
- The more you know about the SAS Programming Language (i.e., the “Data Step”) the easier it is to work with the ODS Output Destination

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The PDF Destination

- “Delivers” SAS-generated output to a Portable Document File (PDF)
 - One of the most common “real-world” methods of “delivering” SAS output to non-SAS users
 - Recipient only needs the free Adobe™ Reader
 - SAS creates the PDF directly; no need to have Adobe Acrobat or other products
 - Many government agencies use PDF Destination to fulfill public reporting requirements and/or ad hoc information requests.
 - SAS Procedures “do the work” (i.e., the analyses)
 - ODS PDF destination delivers “the work” to a file that can be given to the recipient
 - Almost impossible for the recipient to change the data in the report

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The PDF Destination

```
218 ods listing close;
219 ods pdf file = 'c:\combine1.pdf' style=sasweb;
220 proc print data=combine label;
221 format dependent $depvarf.;
222 title5 'Combining ODS Objects in to One SAS Data Set';
223 run;
224 ods pdf close;
225 ods listing;
```

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The PDF Destination

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Introduction to Multivariate Analysis
Combining ODS Objects in to One SAS Data Set

| Obs | Name of Dependent Variable | Name of Independent Variable | Degrees of Freedom | F-Statistic Value | Probability Value | R Square | Dependent Variable Mean |
|-----|----------------------------|------------------------------|--------------------|-------------------|-------------------|----------|-------------------------|
| 1 | Satis. w/Job | DETACHMENT | 9 | 2.05 | 0.0428 | 0.176875 | 3.650000 |
| 2 | Satis. w/Salary & Benefits | DETACHMENT | 9 | 0.92 | 0.5131 | 0.087709 | 3.656250 |
| 3 | Satis. w/Command. Offcr. | DETACHMENT | 9 | 7.42 | <.0001 | 0.437142 | 3.979167 |
| 4 | Satis. w/Co-Workers | DETACHMENT | 9 | 0.99 | 0.4541 | 0.093904 | 4.197917 |

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Controlling Output Appearance

- **ODS STYLE Statements in PROCs PRINT, REPORT and TABULATE**
 - Control the appearance of report elements (e.g., font, colors, background, etc.) without having to write your own ODS Style Template
 - Very powerful, flexible, especially when combined with PROC REPORT capabilities
 - **See: “Traffic-Lighting Your Reports the Easy Way with PROC REPORT and ODS,” available for download from www.SierraInformation.com**

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Controlling Output Appearance

Example of an ODS Style Statement controlling how the column headers appear in the report. The Style statement overrides the SASWEB Style Template's assignment of blue as the color for the column headers.

```
226
227 options orientation=landscape;
228 ods pdf file = 'c:\pdf1.pdf' style=sasweb;
229 ods listing close;
230 proc report nowindows
231     data=combine
232     style(header)=[font_weight=bold background=black foreground=white]
233     style=sasweb split = * ;
234 column dependent source df depmean rsquare fvalue probf;
235 define dependent/display format=$depvarf. 'Dependent*Variable*Name' width=45;
236 define source/display 'Independent*Variable*Name' width=12;
237 define df / display width = 13 'Degrees*of*Freedom' width =10;
238 define depmean / display format=8.2 'Mean of*Dependent*Variable' width = 12;
239 define rsquare / display 'R-Square' width = 8 format=8.4;
240 define fvalue / display 'ANOVA*F*Statistic' width = 10;
241 define probf / display 'Prob. of*Type I*Error' width = 10;
242 title5 'Using PROC REPORT';
243 run;
244 ods pdf close;
245 ods listing;
```



Controlling Output Appearance

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Introduction to Multivariate Analysis
Using PROC REPORT

| Dependent Variable Name | Independent Variable Name | Degrees of Freedom | Mean of Dependent Variable | R-Square | ANOVA F Statistic | Prob. of Type I Error |
|----------------------------|---------------------------|--------------------|----------------------------|----------|-------------------|-----------------------|
| Satis. w/Job | DETACHMENT | 9 | 3.65 | 0.1769 | 2.05 | 0.0428 |
| Satis. w/Salary & Benefits | DETACHMENT | 9 | 3.66 | 0.0877 | 0.92 | 0.5131 |
| Satis. w/Command. Offcr. | DETACHMENT | 9 | 3.98 | 0.4371 | 7.42 | <.0001 |
| Satis. w/Co-Workers | DETACHMENT | 9 | 4.20 | 0.0939 | 0.99 | 0.4541 |

● ● ● Traffic-Lighting Values in Cells

- One of the most commonly asked “how hard would it be” questions...
 - How can we change the appearance of data in the cells of a report based on a “decision-rule”?
 - Can we do this WITHOUT manual intervention in the report generation process? Can SAS do it for us “automatically”?
 - YES!
 - Combine PROC FORMAT, PROC REPORT and ODS Style Statements

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● ● ● Traffic-Lighting Values in Cells

- I created a Value Format that assigns colors to ranges of data values (see slide 28).
- In the next PROC REPORT “step,” an ODS Style Statement was used to “style” the column displaying the p-value. The “rules” contained in the PVALF Style Format are used to decide what color (blue, green or red) is used to display the p-value in the output report.

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Traffic-Lighting Values in Cells

```
247
248 options orientation=landscape;
249 ods pdf file = 'c:\pdf2.pdf' style=sasweb;
250 ods listing close;
251 proc report nowindows
252     data=combine
253     style(header)=[font_weight=bold background=black foreground=white]
254     style=sasweb split = '*';
255 column dependent source df depmean rsquare fvalue probf;
256 define dependent/display format=$depvarf. 'Dependent*Variable*Name' width=45;
257 define source/display 'Independent*Variable*Name' width=12;
258 define df / display width = 13 'Degrees*of*Freedom' width =10;
259 define depmean / display format=8.2 'Mean of*Dependent*Variable' width = 12;
260 define rsquare / display 'R-Square' width = 8 format=8.4;
261 define fvalue / display 'ANOVA*F*Statistic' width = 10;
262 define probf / display 'Prob. of*Type I*Error' width = 10
263     style(column)=[font_weight=bold foreground=pvalf.];
264 title5 'Using PROC REPORT';
265 run;
266 ods pdf close;
267 ods listing;
```

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Traffic-Lighting Values in Cells

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Introduction to Multivariate Analysis
Using PROC REPORT

| Dependent Variable Name | Independent Variable Name | Degrees of Freedom | Mean of Dependent Variable | R-Square | ANOVA F Statistic | Prob. of Type I Error |
|----------------------------|---------------------------|--------------------|----------------------------|----------|-------------------|-----------------------|
| Satis. w/Job | DETACHMENT | 9 | 3.65 | 0.1769 | 2.05 | 0.0428 |
| Satis. w/Salary & Benefits | DETACHMENT | 9 | 3.66 | 0.0877 | 0.92 | 0.5131 |
| Satis. w/Command. Offcr. | DETACHMENT | 9 | 3.98 | 0.4371 | 7.42 | <.0001 |
| Satis. w/Co-Workers | DETACHMENT | 9 | 4.20 | 0.0939 | 0.99 | 0.4541 |

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Changing Appearance of Rows Based on Data in a Cell

- Another frequently asked “how hard would it be” question...
 - Can I have SAS “call attention” to an entire row of my output based on the value in one cell of the row?
 - Can SAS do this “automatically” so I don’t have to review my output manually every time I do an analysis or my data set changes?
 - YES!

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Changing Appearance of Rows Based on Data in a Cell

- *COMPUTE* Block
 - Allows you to compute new columns in the report, or to test values in the columns as the PROC builds your report
 - Two Papers by Art Carpenter
 - “*Advanced PROC REPORT: Doing More in the COMPUTE Block*”
 - <http://www2.sas.com/proceedings/forum2007/242-2007.pdf>
 - “*In the COMPUTE Block: Issues Associated with Using and Naming Variables*”
 - <http://www2.sas.com/proceedings/forum2007/025-2007.pdf>
- *CALL DEFINE* Statement

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Changing Appearance of Rows Based on Data in a Cell

```

271 options orientation=landscape;
272 ods pdf file = 'c:\pdf3.pdf' style=sasweb;
273 ods listing close;
274 proc report nowindows
275     data=combine
276     style(header)=[font_weight=bold background=gray foreground=white]
277     style=sasweb split = '*';
278 column dependent source df depmean rsquare fvalue probf;
279 define dependent/display format=Sdepvarf. 'Dependent*Variable*Name' width=45;
280 define source/display 'Independent*Variable*Name' width=12;
281 define df / display width = 13 'Degrees*of*Freedom' width =10;
282 define depmean / display format=8.2 'Mean of*Dependent*Variable' width = 12;
283 define rsquare / display 'R-Square' width = 8 format=8.4;
284 define fvalue / display 'ANOVA*F*Statistic' width = 10;
285 define probf / display 'Prob. of*Type I*Error' ;
286 compute probf;
287 if probf < .05 then do;
288     call define(_row_,"style",
289         "style=[font_weight=bold background=black foreground=white
290             font_style=italic]");
291     end;
292 endcomp;
293 titles Using PROC REPORT ;
294 run;
295 ods pdf close;
296 ods listing;

```

Changing Appearance of Rows Based on Data in a Cell

GWU School of Business
 Decision Science 276: Exploratory and Multivariate Data Analysis
 Lecture 4: Fall 2007 Semester
 Introduction to Multivariate Analysis
 Using PROC REPORT

| Dependent Variable Name | Independent Variable Name | Degrees of Freedom | Mean of Dependent Variable | R-Square | ANOVA F Statistic | Prob. of Type I Error |
|----------------------------|---------------------------|--------------------|----------------------------|----------|-------------------|-----------------------|
| Satis. w/Job | DETACHMENT | 9 | 3.66 | 0.1769 | 2.05 | 0.0428 |
| Satis. w/Salary & Benefits | DETACHMENT | 9 | 3.66 | 0.0877 | 0.92 | 0.5131 |
| Satis. w/Command. Offcr. | DETACHMENT | 9 | 3.98 | 0.4371 | 7.42 | <.0001 |
| Satis. w/Co-Workers | DETACHMENT | 9 | 4.20 | 0.0939 | 0.99 | 0.4541 |



Adding Graphics Images

➤ A More Advanced ODS Example:

- Adding graphics images to the PROC REPORT output delivered as a PDF file.
- Requires a more detailed understanding of both PROC REPORT and ODS, but if you look at the code on the next slide for a while, and read the SAS user group papers I've referenced earlier, you can figure out what is going on.

45



Adding Graphics Images

```
305 ods pdf file = 'c:\pdf4.pdf' style=sasweb;
306 ods listing close;
307 proc report nowindows data=combine style=sasweb split = '*';
308   style(header)=[font_weight=bold background=gray foreground=white]
309   style(report)=
310     [preimage='C:\Documents and Settings\Andrew Karp\Desktop\DN80276\rcmp_symbol.jpg'];
311   column dependent source df depmean rsquare tvalue probf;
312   define dependent / display format=5depvarf. 'Dependent*Variable*Name' width=45;
313   define source / display 'Independent*Variable*Name' width=12;
314   define df / display 'Degrees*of*Freedom' width =10 center;
315   define depmean / display format=8.2 'Mean of*Dependent*Variable' width = 12;
316   define rsquare / display 'R-Square' width = 8 format=8.4;
317   define tvalue / display 'ANOVA*F*Statistic' width = 10;
318   define probf / display 'Prob. of*Type I*Error' ;
319   compute before _page_/left
320     style=[preimage='C:\Documents and Settings\Andrew Karp\Desktop\DN80276\rcmp_logo_e.jpg'
321       foreground=red font_weight=bold font_size=6];
322   LINE 'Gendarmerie Royal du Canada';
323   endcomp;
324   compute after _page_/right
325     style=[postimage='C:\Documents and Settings\Andrew Karp\Desktop\DN80276\rcmp_logo_f.jpg'
326       foreground=red font_weight=bold font_size=6];
327   LINE 'Gendarmerie Royal du Canada';
328   endcomp;
329   compute probf;
330   if probf < .05 then do;
331     call define(_row_, 'style',
332       'style=[font_weight=bold background=black foreground=white
333         font_style=italic]');
334   end;
335   endcomp;
336 title5 'PROC REPORT Output w/ODS & Graphics Images';
337 run;
```



Adding Graphics Images

GWU School of Business
Decision Science 276: Exploratory and Multivariate Data Analysis
Lecture 4: Fall 2007 Semester
Introduction to Multivariate Analysis
PROC REPORT Output w/ODS & Graphics Images



Royal Canadian Mounted Police

| Dependent Variable Name | Independent Variable Name | Degrees of Freedom | Mean of Dependent Variable | R-Square | ANOVA F Statistic | Prob. of Type I Error |
|----------------------------|---------------------------|--------------------|----------------------------|----------|-------------------|-----------------------|
| Satis. w/Job | DETACHMENT | 9 | 3.65 | 0.1769 | 2.05 | 0.0428 |
| Satis. w/Salary & Benefits | DETACHMENT | 9 | 3.66 | 0.0877 | 0.92 | 0.5131 |
| Satis. w/Command. Officer | DETACHMENT | 9 | 3.98 | 0.4371 | 7.42 | <.0001 |
| Satis. w/Co-Workers | DETACHMENT | 9 | 4.20 | 0.0939 | 0.99 | 0.4541 |

Gendarmerie Royale du Canada



Highlighting Every Other Row in a Report

```
8 options orientation=landscape;
9 proc report nowindows data=sasclass.electricity headline headskip;
10 column office kwh1 kwh2 kwh3 q1kwh;
11 define office/group 'Local Office';
12 define kwh1/analysis sum 'January Revenue' Format = dollar14. width = 16;
13 define kwh2/analysis sum 'February Revenue' Format = dollar14. width = 16;
14 define kwh3/analysis sum 'March Revenue' Format = dollar14. width = 16;
15 define q1kwh/computed 'First Quarter Revenue' format=dollar14. width = 16;
16 compute q1kwh;
17   q1kwh = sum(kwh1.sum,kwh2.sum,kwh3.sum);
18   endcomp;
19 title 'Getting Un-Stuck in the Traffic-Lighting';
20 title2 'Highlighting Every Other Row in a Report';
21 run;
```

Highlighting Every Other Row in a Report

Getting Un-Stuck in the Traffic-Lighting
Highlighting Every Other Row in a Report

| Local Office | January Revenue | February Revenue | March Revenue | First Quarter Revenue |
|---------------|-----------------|------------------|---------------|-----------------------|
| ALTURAS | \$709,272 | \$620,531 | \$601,945 | \$1,931,648 |
| ARCATA | \$571,650 | \$507,866 | \$472,250 | \$1,551,766 |
| BISHOP | \$220,883 | \$208,674 | \$212,709 | \$642,266 |
| CHONCHILLA | \$42,997 | \$30,451 | \$25,478 | \$98,926 |
| COULTERVILLE | \$37,019 | \$31,123 | \$29,918 | \$98,060 |
| CRESCENT CITY | \$351,653 | \$309,358 | \$299,731 | \$960,742 |
| FRESNO | \$142,134 | \$113,751 | \$95,900 | \$351,785 |
| GILROY | \$389,523 | \$393,725 | \$365,527 | \$1,112,775 |
| HALF MOON BAY | \$311,757 | \$300,964 | \$306,804 | \$919,525 |
| HANFORD | \$71,407 | \$50,071 | \$42,643 | \$164,121 |
| INDEPENDENCE | \$165,111 | \$155,659 | \$154,554 | \$475,324 |
| JACKSON | \$296,079 | \$281,201 | \$294,713 | \$871,993 |
| LONE PINE | \$220,367 | \$204,720 | \$201,623 | \$626,710 |
| MADERA | \$130,238 | \$93,560 | \$75,265 | \$299,063 |
| MARIPOSA | \$271,242 | \$270,462 | \$254,560 | \$796,264 |
| MARKLEEVILLE | \$164,496 | \$144,860 | \$144,257 | \$453,613 |
| MERCED | \$84,987 | \$66,892 | \$53,885 | \$205,764 |
| MONTEREY | \$362,506 | \$342,372 | \$344,096 | \$1,048,974 |
| OAKHURST | \$239,836 | \$225,513 | \$228,774 | \$694,123 |
| RED BLUFF | \$470,697 | \$410,039 | \$393,399 | \$1,274,135 |
| REDDING | \$1,339,399 | \$1,045,700 | \$994,417 | \$3,379,536 |
| REEDLEY | \$54,715 | \$42,439 | \$37,975 | \$135,129 |
| RIPON | \$308,238 | \$307,772 | \$311,112 | \$927,122 |
| SALINAS | \$638,169 | \$611,714 | \$627,631 | \$1,877,514 |
| SANTA CRUZ | \$570,804 | \$554,049 | \$560,908 | \$1,685,761 |
| SELMA | \$24,763 | \$22,216 | \$20,900 | \$67,879 |
| SONORA | \$276,285 | \$263,540 | \$260,948 | \$800,773 |
| SUSANVILLE | \$283,115 | \$261,944 | \$259,544 | \$804,603 |

Highlighting Every Other Row in a Report

```

23 ods listing close;
24 ods pdf file = 'C:\everyotherrow1.pdf' style=journal;
25 proc report nowindows data=sasclass.electricity headline headskip;
26 column office kwh1 kwh2 kwh3 q1kwh;
27 define office/group 'Local Office';
28 define kwh1/analysis sum 'January Revenue' Format = dollar14. width = 16;
29 define kwh2/analysis sum 'February Revenue' Format = dollar14. width = 16;
30 define kwh3/analysis sum 'March Revenue' Format = dollar14. width = 16;
31 define q1kwh/computed 'First Quarter Revenue' format=dollar14. width = 16;
32 compute q1kwh;
33   q1kwh = sum(kwh1.sum, kwh2.sum, kwh3.sum);
34   endcomp;
35 title 'Getting Un-Stuck in the Traffic-Lighting';
36 title2 'Highlighting Every Other Row in a Report';
37 run;
38 ods pdf close;
39 ods listing;

```

Highlighting Every Other Row in a Report

Getting Un-Stuck in the Traffic-Lighting
Highlighting Every Other Row in a Report

| Local Office | January Revenue | February Revenue | March Revenue | First Quarter Revenue |
|---------------|-----------------|------------------|---------------|-----------------------|
| ALTURAS | \$758,272 | \$620,531 | \$601,845 | \$1,981,648 |
| ARCATA | \$571,650 | \$507,895 | \$472,250 | \$1,551,795 |
| BISHOP | \$230,883 | \$208,874 | \$212,709 | \$652,466 |
| CHOWCHILLA | \$42,997 | \$30,451 | \$25,478 | \$98,926 |
| COLLIERVILLE | \$37,819 | \$31,123 | \$29,918 | \$98,860 |
| CRESCENT CITY | \$351,650 | \$309,358 | \$299,731 | \$960,742 |
| FRESNO | \$142,134 | \$113,751 | \$95,900 | \$351,785 |
| GILROY | \$383,523 | \$363,725 | \$365,527 | \$1,112,775 |
| HALF MOON BAY | \$311,757 | \$300,964 | \$306,804 | \$919,525 |
| HANFORD | \$71,407 | \$50,071 | \$42,843 | \$164,321 |
| INDEPENDENCE | \$165,111 | \$155,859 | \$154,554 | \$475,524 |
| JACKSON | \$296,079 | \$281,201 | \$294,713 | \$871,993 |
| LONE PINE | \$220,367 | \$204,720 | \$201,623 | \$626,710 |
| MADERA | \$130,238 | \$93,580 | \$75,265 | \$299,083 |
| MARIPOSA | \$271,242 | \$270,462 | \$254,560 | \$796,264 |
| MARKLEEVILLE | \$164,496 | \$144,880 | \$144,257 | \$453,633 |
| MERCED | \$94,907 | \$96,892 | \$53,085 | \$244,884 |
| MONTEREY | \$362,506 | \$342,372 | \$344,096 | \$1,048,974 |
| OAKHURST | \$239,836 | \$225,513 | \$220,774 | \$686,123 |
| RED BLUFF | \$470,697 | \$410,039 | \$393,399 | \$1,274,135 |
| REDDING | \$1,329,399 | \$1,045,700 | \$994,417 | \$3,379,516 |
| REDFORD | \$54,715 | \$42,430 | \$37,975 | \$135,120 |
| RIPON | \$308,230 | \$307,772 | \$311,112 | \$927,112 |
| SALINAS | \$638,169 | \$611,714 | \$627,631 | \$1,877,514 |
| SANTA CRUZ | \$570,804 | \$554,049 | \$560,908 | \$1,685,761 |
| SELMA | \$34,763 | \$22,216 | \$20,900 | \$77,879 |
| SONORA | \$276,205 | \$263,540 | \$260,948 | \$800,693 |
| SUSANVILLE | \$283,115 | \$281,944 | \$259,944 | \$824,003 |

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Highlighting Every Other Row in a Report

```

41 ods listing close;
42 ods pdf file = 'C:\everyotherrow2.pdf' style=journal;
43 proc report nowindows data=sasclass.electricity headline headskip;
44   column office kwh1 kwh2 kwh3 q1kwh;
45   define office/group 'Local Office';
46   define kwh1/analysis sum 'January Revenue' format = dollar14. width = 16;
47   define kwh2/analysis sum 'February Revenue' format = dollar14. width = 16;
48   define kwh3/analysis sum 'March Revenue' format = dollar14. width = 16;
49   define q1kwh/computed 'First Quarter Revenue' format=dollar14. width = 16;
50   compute q1kwh;
51     q1kwh = sum(kwh1.sum,kwh2.sum,kwh3.sum);
52   endcomp;
53   compute office;
54     count + 1;
55     * use the MOD programming lang. function to determine if COUNT is odd or even;
56     if (mod(count,2)) = 0 then do;
57       call define(_row_,'STYLE','STYLE=[background=gray foreground=white]');
58     end;
59   endcomp;
60 title 'Getting Un-Stuck in the Traffic-Lighting';
61 title2 'Highlighting Every Other Row in a Report';
62 title3 'Highlighting the Even Rows';
63 run;
64 ods pdf close;

```



Highlighting Every Other Row in a Report

*Getting Un-Stuck in the Traffic-Lighting
Highlighting Every Other Row in a Report*

| Local Office | January Revenue | February Revenue | March Revenue | First Quarter Revenue |
|---------------|-----------------|------------------|---------------|-----------------------|
| ALTURAS | \$708,272 | \$620,531 | \$601,845 | \$1,931,648 |
| ARCATA | \$571,650 | \$507,866 | \$472,250 | \$1,551,766 |
| BISHOP | \$220,883 | \$208,674 | \$212,709 | \$642,266 |
| CHOWCHILLA | \$42,997 | \$30,451 | \$25,478 | \$98,926 |
| COULTERVILLE | \$37,019 | \$31,123 | \$29,918 | \$98,060 |
| CRESCENT CITY | \$351,653 | \$309,358 | \$299,731 | \$960,742 |
| FRESNO | \$142,134 | \$113,751 | \$95,900 | \$351,785 |
| GILROY | \$383,523 | \$363,725 | \$365,527 | \$1,112,775 |
| HALF MOON BAY | \$311,757 | \$300,964 | \$306,804 | \$919,525 |
| HANFORD | \$71,407 | \$50,071 | \$42,643 | \$164,121 |
| INDEPENDENCE | \$165,111 | \$155,659 | \$154,554 | \$475,324 |
| JACKSON | \$296,079 | \$281,201 | \$294,713 | \$871,993 |
| LONE PINE | \$220,367 | \$204,720 | \$201,623 | \$626,710 |
| MADERA | \$130,238 | \$93,560 | \$75,285 | \$299,083 |
| MARIPOSA | \$271,242 | \$270,462 | \$254,560 | \$796,264 |
| MARLEEVILLE | \$194,496 | \$144,860 | \$144,257 | \$483,613 |
| MERCED | \$84,987 | \$86,892 | \$53,885 | \$225,764 |
| MONTEREY | \$382,506 | \$342,372 | \$344,086 | \$1,068,974 |
| OAKHURST | \$239,836 | \$225,513 | \$228,774 | \$694,123 |
| RED BLUFF | \$470,697 | \$410,039 | \$393,369 | \$1,274,135 |
| REDDING | \$1,338,369 | \$1,045,780 | \$994,417 | \$3,379,566 |
| REEDLEY | \$54,715 | \$42,439 | \$37,975 | \$135,129 |
| RIPON | \$308,238 | \$307,772 | \$311,112 | \$927,122 |
| SALINAS | \$638,169 | \$611,714 | \$627,631 | \$1,877,514 |
| SANTA CRUZ | \$570,804 | \$554,049 | \$560,908 | \$1,685,761 |
| SELMA | \$24,763 | \$22,216 | \$20,900 | \$67,879 |
| SONORA | \$276,285 | \$263,540 | \$260,948 | \$800,773 |
| SUSANVILLE | \$283,115 | \$261,944 | \$259,544 | \$804,603 |

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Exporting SAS Procedure Output to CSV Files

- **CSV (Comma-Separated Values) ODS Destination**
 - Creates text files in CSV format from Procedure-generated “tables”
 - One of many ways to move SAS procedure-generated output to file types that can be read by Microsoft products such as Excel and Word

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Exporting SAS Procedure Output to CSV Files

➤ Example:

- Output parameter estimates from a multiple regression analysis generated by PROC REG to a CSV file
 - Then, open the CSV file in EXCEL
 - SAS 8: **CSV** Destination
 - Writes only the body of the output to the CSV file
 - SAS 9: **CSVALL** Destination
 - Titles/footnotes/by-lines are also written to the CSV file

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Exporting SAS Procedure Output to CSV Files

```
Exchanging Data from SAS to Microsoft
Creating CSV Files from SAS Procedure-Generated Output

The REG Procedure
Model: MODEL1
Dependent Variable: DEPVAR Dependent Variable
```

| Parameter Estimates | | | | | | |
|---------------------|-------------|----|--------------------|----------------|---------|---------|
| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > t |
| Intercept | Intercept | 1 | 630.79485 | 450.14931 | 1.40 | 0.1685 |
| Y1 | Indep Var 1 | 1 | 0.27183 | 0.51595 | 0.53 | 0.6011 |
| Y2 | Indep Var 2 | 1 | 0.97863 | 0.37231 | 2.63 | 0.0119 |
| Y3 | Indep Var 3 | 1 | -1.01370 | 0.62189 | -1.63 | 0.1106 |
| Y4 | Indep Var 4 | 1 | -0.77425 | 0.66169 | -1.17 | 0.2486 |
| Y5 | Indep Var 5 | 1 | 0.15735 | 0.58337 | 0.27 | 0.7887 |
| Y6 | Indep Var 6 | 1 | -0.98877 | 0.55305 | -1.79 | 0.0810 |
| Y7 | Indep Var 7 | 1 | 13.80626 | 1.58775 | 8.70 | <.0001 |

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Exporting SAS Procedure Output to CSV Files

```
194
195 ods select parameterestimates;
196 ods listing close; * no output to listing destination;
197 ods csv file =
198 "C:\Documents and Settings\Owner\Desktop\DataTransfer2008\parms1.csv";
199 * note: CSVALL available in SAS 9;
200 ods csvall file =
201 "C:\Documents and Settings\Owner\Desktop\DataTransfer2008\parms2.csv";
202 proc reg data=transfer.regressdata;
203 model depvar = y1-y7;
204 title 'Exchanging Data from SAS to Microsoft';
205 title2 'Creating CSV Files from SAS Procedure-Generated Output';
206 footnote1 'CSVALL Writes SAS System Titles and Footnotes to the CSV File';
207 quit;
208 ods csv close;
209 ods csvall close;
210 ods listing; * re-open listing destination;
```

In this example, the CSV and CSVALL destinations are open to “receive” the parameter estimates generated by PROC REG. In practice, you’ll probably want to use just one of them.

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Exporting SAS Procedure Output to CSV Files

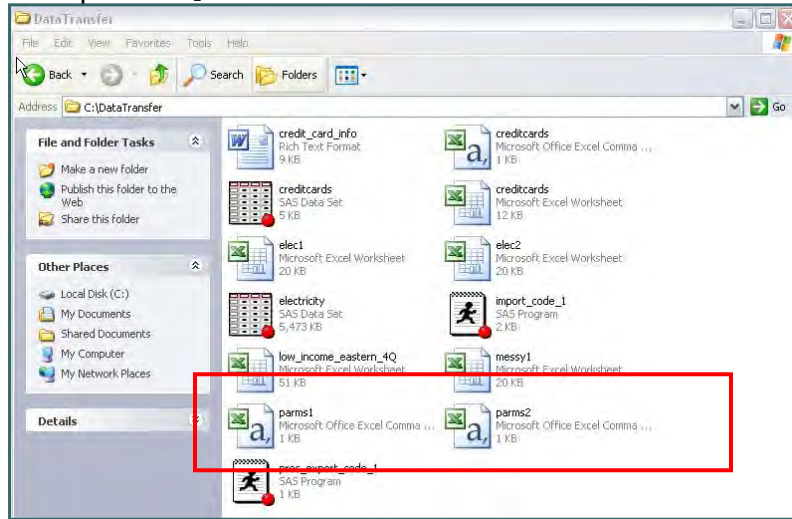
```
528 ods select parameterestimates;
529 ods listing close; * no output to listing destination;
530 ods csv file = 'C:\datatransfer\parms1.csv';
NOTE: Writing CSV Body file: C:\datatransfer\parms1.csv
531 * note: CSVALL available in SAS 9;
532 ods csvall file = 'C:\datatransfer\parms2.csv';
NOTE: Writing CSVALL Body file: C:\datatransfer\parms2.csv
533 proc reg data=sasclass.regressdata;
534 model depvar = y1-y7;
535 title 'Exchanging Data from SAS to Microsoft';
536 title2 'Creating CSV Files from SAS Procedure-Generated Output';
537 quit;

NOTE: PROCEDURE REG used (Total process time):
      real time           0.12 seconds
      cpu time            0.04 seconds

538 ods csv close;
539 ods csvall close;
540 ods listing; * re-open listing destination;
```

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Exporting SAS Procedure Output to CSV Files



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Exporting SAS Procedure Output to CSV Files

```

Parameter Estimates
Variable Label DF ParameterEstimate standardError t Value Pr > |t|
Intercept Intercept 1 630.79485 450.14931 1.40 0.1685
Y1 Indep Var 1 1 0.27183 0.51595 0.53 0.6011
Y2 Indep Var 2 1 0.97863 0.37231 2.63 0.0119
Y3 Indep Var 3 1 -1.01370 0.62189 -1.63 0.1106
Y4 Indep Var 4 1 -0.77425 0.66169 -1.17 0.2486
Y5 Indep Var 5 1 0.15735 0.58337 0.27 0.7887
Y6 Indep Var 6 1 -0.98877 0.55305 -1.79 0.0810
Y7 Indep Var 7 1 13.80626 1.58775 8.70 <.0001

```

Parameter Estimates Table Saved as a CSV File using the ODS CSV Destination

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Exporting SAS Procedure Output to CSV Files

| | A | B | C | D | E | F | G |
|----|---------------------|-------------|----|-------------------|---------------|---------|---------|
| 1 | Parameter Estimates | | | | | | |
| 2 | Variable | Label | DF | ParameterEstimate | StandardError | t Value | Pr > t |
| 3 | Intercept | Intercept | 1 | 630.79485 | 450.14931 | 1.4 | 0.1685 |
| 4 | Y1 | Indep Var 1 | 1 | 0.27183 | 0.51595 | 0.53 | 0.6011 |
| 5 | Y2 | Indep Var 2 | 1 | 0.97863 | 0.37231 | 2.63 | 0.0119 |
| 6 | Y3 | Indep Var 3 | 1 | -1.0137 | 0.62189 | -1.63 | 0.1106 |
| 7 | Y4 | Indep Var 4 | 1 | -0.77425 | 0.66169 | -1.17 | 0.2486 |
| 8 | Y5 | Indep Var 5 | 1 | 0.15735 | 0.58337 | 0.27 | 0.7887 |
| 9 | Y6 | Indep Var 6 | 1 | -0.98877 | 0.55305 | -1.79 | 0.0810 |
| 10 | Y7 | Indep Var 7 | 1 | 13.80626 | 1.58775 | 8.70 | <.0001 |

CSV Destination Output Opened in Excel

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Exporting SAS Procedure Output to CSV Files

```

params2 - Notepad
File Edit Format View Help
Exchanging Data from SAS to Microsoft

Creating CSV Files from SAS Procedure-Generated Output

The REG Procedure
Model: MODEL1
Dependent Variable: DEPVAR Dependent Variable
"Parameter Estimates"
"Variable","Label","DF","ParameterEstimate","StandardError","t Value","Pr > |t|"
"Intercept","Intercept","1",630.79485,450.14931,1.40,0.1685
"Y1","Indep Var 1","1",0.27183,0.51595,0.53,0.6011
"Y2","Indep Var 2","1",0.97863,0.37231,2.63,0.0119
"Y3","Indep Var 3","1",-1.01370,0.62189,-1.63,0.1106
"Y4","Indep Var 4","1",-0.77425,0.66169,-1.17,0.2486
"Y5","Indep Var 5","1",0.15735,0.58337,0.27,0.7887
"Y6","Indep Var 6","1",-0.98877,0.55305,-1.79,0.0810
"Y7","Indep Var 7","1",13.80626,1.58775,8.70,<.0001"

CSVALL Writes SAS System Titles and Footnotes to the CSV File
  
```

Parameter Estimates Table Saved as a CSV File
using the ODS CSVALL Destination

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Exporting SAS Procedure Output to CSV Files

| Variable | Label | DF | ParameterEstimate | StandardError | t Value | Pr > t |
|-----------|-------------|----|-------------------|---------------|---------|---------|
| Intercept | Intercept | 1 | 630.79485 | 450.14931 | 1.4 | 0.1685 |
| Y1 | Indep Var 1 | 1 | 0.27183 | 0.51595 | 0.53 | 0.6011 |
| Y2 | Indep Var 2 | 1 | 0.97863 | 0.37231 | 2.63 | 0.0119 |
| Y3 | Indep Var 3 | 1 | -1.0137 | 0.62189 | -1.63 | 0.1106 |
| Y4 | Indep Var 4 | 1 | -0.77425 | 0.66169 | -1.17 | 0.2486 |
| Y5 | Indep Var 5 | 1 | 0.15735 | 0.58337 | 0.27 | 0.7887 |
| Y6 | Indep Var 6 | 1 | -0.98877 | 0.55305 | -1.79 | 0.081 |
| Y7 | Indep Var 7 | 1 | 13.80626 | 1.58775 | 8.7 | <.0001 |

CSVALL Destination Output Opened in Excel

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Other ODS Tools/Features for Moving SAS-Generated Output to Excel-Readable Files

► HTML Destination

- One of the most common ways to move SAS procedure-generated output in to a file that can then be opened in Excel
- Although we use XLS as the file extension, SAS is creating an HTML file that is *opened* by Excel
 - You need to do “File...Save As...Workbook” in order to make it a “real” Excel Spreadsheet

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Other ODS Tools/Features for Moving SAS-Generated Output to Excel-Readable Files

➤ ODS HTML Destination with “.XLS” as the File Extension

- Very easy to implement
 - Small increase in coding on the SAS “side” results in a nice-looking Excel-readable file
- Style Templates and ODS STYLE statements can be used to customize appearance of the file
 - But, there are some drawbacks:
 - Only one worksheet at a time
 - SAS “thinks” like it is creating an HTML file, which is really what it is doing

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Other ODS Tools/Features for Moving SAS-Generated Output to Excel-Readable Files

➤ XML Destination and Tagsets

- SAS Institute-supplied Tagsets
 - **EXCELXP** is probably the most popular, but there are others
 - Creates XML files that can be opened/saved as multi-sheet Excel Workbooks
 - Many other features (e.g., frozen headers, table of contents)
 - Free, downloadable from SAS Support web site

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Information About XML Tagsets Available from SAS

Updated SAS 9.1 Tagsets to Download Individually

CSV, CSVALL, CSVBYLINE (April 2006)
This May 2005 update to the SAS 9.1.3 tagset has enhanced features and performance over the released version. New to this tagset is a fix for some problems caused by a specific form of Proc Tabulate. Another fix has to do with treating currency as numbers or character strings. For examples, see the SUGI 31 paper *The Beginner's Guide to ODS MARKUP: Don't Panic!* (pdf). The following ODS Statement will provide complete details of all the new features:
ODS CSV file="test.csv" options(doc="help")

ExcelXP *new update!* April 2008 (version 1.66, 04/16/08)
See the quick reference to options and change log for the tagset.
This new update to the SAS 9.1.3 tagset has enhanced features and performance over the released version. This new version has too many new features to list! Some highlights include better column widths and spacing control, control over many print options, generation of a table of contents or an index of worksheets, and worksheet intervals that break on bygroups. Output from the ExcelXP tagset also works with the Calc spreadsheet program from OpenOffice.org. The following ODS Statement will provide complete details of all the new features:
ODS tagsets.excelxp file="test.xml" options(doc="help")

Previous versions of the ExcelXP tagset are available:

- June 2007 (version 1.72, 06/09/07)
- May 2007 (version 1.62, 05/11/07)
- June 2006 (version 1.37, 05/31/06)

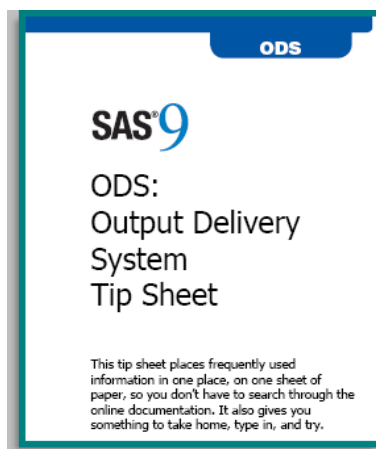
See ExcelXP samples in these papers and presentations:

- ODS MARKUP: The SAS Reports You've Always Dreamed Of (pdf) and the paper's example code (zip)
- Example code for ODS Tagsets & Excel, an Excellent Combination (zip)
- The Beginner's Guide to ODS MARKUP: Don't Panic! (pdf) and the paper's example code (zip)

<http://support.sas.com/rnd/base/ods/odsmarkup/index.html#download>

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ODS Tip Sheet (PDF)



Handy two-page "tip sheet" on core ODS commands and capabilities available for free download from the SAS Support Web Site



<http://support.sas.com/rnd/base/ods/scratch/ods-tips.pdf>

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SAS-Supplied ODS Styles in SAS 9.1.3

- How can I learn which Style Templates are available where I SAS Software?

```
360 proc template;
361     list styles;
362 run;
```

Listing of: SASHELP.TMPLMST
Path Filter is: Styles
Sort by: PATH/ASCENDING

| Obs | Path | Type |
|-----|--------------------------|-------|
| 1 | Styles | Dir |
| 2 | Styles.Analysis | Style |
| 3 | Styles.Astronomy | Style |
| 4 | Styles.Banker | Style |
| 5 | Styles.BarrettsBlue | Style |
| 6 | Styles.Beige | Style |
| 7 | Styles.Brick | Style |
| 8 | Styles.Brown | Style |
| 9 | Styles.Curve | Style |
| 10 | Styles.D3d | Style |
| 11 | Styles.Default | Style |
| 12 | Styles.EDefault | Style |
| 13 | Styles.Education | Style |
| 14 | Styles.Electronics | Style |
| 15 | Styles.Festival | Style |
| 16 | Styles.FestivalPrinter | Style |
| 17 | Styles.Gears | Style |
| 18 | Styles.Journal | Style |
| 19 | Styles.Magnify | Style |
| 20 | Styles.Meadow | Style |
| 21 | Styles.MeadowPrinter | Style |
| 22 | Styles.Minimal | Style |
| 23 | Styles.Money | Style |
| 24 | Styles.NoFontDefault | Style |
| 25 | Styles.Normal | Style |
| 26 | Styles.NormalPrinter | Style |
| 27 | Styles.Ocean | Style |
| 28 | Styles.Printer | Style |
| 29 | Styles.Rtf | Style |
| 30 | Styles.Saswab | Style |
| 31 | Styles.Science | Style |
| 32 | Styles.SciencePrinter | Style |
| 33 | Styles.Seaside | Style |
| 34 | Styles.SeasidePrinter | Style |
| 35 | Styles.Sketch | Style |
| 36 | Styles.Statdoc | Style |
| 37 | Styles.Statistical | Style |
| 38 | Styles.Theme | Style |
| 39 | Styles.Torn | Style |
| 40 | Styles.Watercolor | Style |
| 41 | Styles.blockPrint | Style |
| 42 | Styles.fancyPrinter | Style |
| 43 | Styles.grayscalePrinter | Style |
| 44 | Styles.monochromePrinter | Style |
| 45 | Styles.sansPrinter | Style |
| 46 | Styles.sasdocPrinter | Style |
| 47 | Styles.serifPrinter | Style |

SAS-Supplied ODS Styles in 9.2

Path Filter is: Styles
Sort by: PATH/ASCENDING

| Obs | Path | Type |
|-----|------------------------|-------|
| 1 | Styles | Dir |
| 2 | Styles.Analysis | Style |
| 3 | Styles.Astronomy | Style |
| 4 | Styles.Banker | Style |
| 5 | Styles.BarrettsBlue | Style |
| 6 | Styles.Beige | Style |
| 7 | Styles.Brick | Style |
| 8 | Styles.Brown | Style |
| 9 | Styles.Curve | Style |
| 10 | Styles.D3d | Style |
| 11 | Styles.Default | Style |
| 12 | Styles.EDefault | Style |
| 13 | Styles.Education | Style |
| 14 | Styles.Electronics | Style |
| 15 | Styles.Festival | Style |
| 16 | Styles.FestivalPrinter | Style |
| 17 | Styles.Gears | Style |
| 18 | Styles.Heruest | Style |
| 19 | Styles.HighContrast | Style |
| 20 | Styles.Journal | Style |
| 21 | Styles.Journal2 | Style |
| 22 | Styles.Journal3 | Style |
| 23 | Styles.Listing | Style |
| 24 | Styles.Magnify | Style |
| 25 | Styles.Meadow | Style |
| 26 | Styles.MeadowPrinter | Style |
| 27 | Styles.Minimal | Style |
| 28 | Styles.Money | Style |
| 29 | Styles.NoFontDefault | Style |

| | | |
|----|-----------------------|-------|
| 30 | Styles.Normal | Style |
| 31 | Styles.NormalPrinter | Style |
| 32 | Styles.Ocean | Style |
| 33 | Styles.Printer | Style |
| 34 | Styles.Rtf | Style |
| 35 | Styles.Saswab | Style |
| 36 | Styles.Science | Style |
| 37 | Styles.SciencePrinter | Style |
| 38 | Styles.Seaside | Style |
| 39 | Styles.SeasidePrinter | Style |
| 40 | Styles.Sketch | Style |
| 41 | Styles.Statdoc | Style |
| 42 | Styles.Statistical | Style |
| 43 | Styles.Theme | Style |
| 44 | Styles.Torn | Style |
| 45 | Styles.Watercolor | Style |

Listing of: SASHELP.TMPLMST
Path Filter is: Styles
Sort by: PATH/ASCENDING

| Obs | Path | Type |
|-----|--------------------------|-------|
| 46 | Styles.Watercolor | Style |
| 47 | Styles.blockPrint | Style |
| 48 | Styles.fancyPrinter | Style |
| 49 | Styles.grayscalePrinter | Style |
| 50 | Styles.monochromePrinter | Style |
| 51 | Styles.sansPrinter | Style |
| 52 | Styles.sasdocPrinter | Style |
| 53 | Styles.serifPrinter | Style |



How Can I Create My Own Style Templates?

> PROC TEMPLATE

- See Haworth, Lauren: “**SAS with STYLE: Creating Your Own Style Templates,**”
 - SAS Global Forum on-line proceedings tool
 - www.SASGlobalForum.org

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Where Can I See Examples of How Each of the SAS-Supplied Style Templates Display Output?

- > Go to www.Sierrainformation.com and click on the “User Group Presentations” link on the left-hand side of the home page.

| PAST PRESENTATIONS | | | | |
|--|-----------------------------------|---|----------|----------------------|
| Presentation Title | Author | Brief | Date | PDF |
| Working with SAS Date and Time Functions: A Beginning Tutorial | Andrew Karp, Sierra Info Services | Working with SAS Date and Time Functions paper | | View |
| Exploiting the Excellent Excel/XP Target | Andrew Karp, Sierra Info Services | Tutorial on using the Excel/XP target to export SAS-generated output to Excel-readable files | Dec 2008 | View |
| The Seven Habits of Highly Effective SAS-ers | David Cassell | Presentation Paper | | View |
| The Seven Habits of Highly Effective SAS-ers | David Cassell | Presentation Slides | | View |
| Using Macro Functions | Art Casperfor | | | View |
| The SAS Debugging Primer | Frank Dizon | | | View |
| SAS EBI: What is it, what will it do for me? | Frederick Prator, Ph.D. | | | View |
| Unteashing the Power of ODS Statistical Graphics in SAS 9.2 Software | Andrew Karp, Sierra Info Services | Overview of ODS Statistical Graphics Capabilities Added in SAS 9.2 Phase One | | View |
| ODS Style Templates in SAS 9.2: Examples Using PROC REPORT | Andrew Karp, Sierra Info Services | Examples of a small PROC REPORT-generated table styled by ODS Style Templates available in SAS 9.2 | | View |
| ODS Style Templates in SAS 9.2: Examples Using PROC FREQ and Statistical Graphics | Andrew Karp, Sierra Info Services | Examples of ODS Stat. Graphics histograms generated by PROC FREQ styled by ODS Style Templates available in SAS 9.2 | | View |
| ODS Style Templates in SAS 9.2: Examples Using the PROC REG Fit Plot Graphic | Andrew Karp, Sierra Info Services | Examples of how the PROC REG-generated Fit Plot appears when styled by the ODS Style Templates available in SAS 9.2 | | View |
| ODS Style Templates in SAS 9.2: Examples Using the PROC REG Diagnostic Panels Plot | Andrew Karp, Sierra Info Services | Examples of how the PROC REG-generated Diagnostic Panels Plot appears when styled by the ODS Style Templates available in SAS 9.2 | | View |

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ODS and Statistical Graphics

- ODS Statistical Graphics extends the ODS framework for “output delivery” of SAS-generated results to include graphics images showing the result of the analyses generated by the Procedure Step
 - Table Output **PLUS** Graphics in One “Step”
 - No need to master SAS/GRAPH® Software Procedures and/or syntax
 - Easy to
 - “Deliver” images to a wide range of file types
 - Control image appearance

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The ODS Stat Graphics Resources

Stat Graph Enabled
Analytical

Procedures:

*60 in BASE, STAT, ETS,
QC, HPF*

Statistical Graphics
PROCS: *4 PROCS in
SAS/GRAPH*



Statistical Graphics Editor
Graph Template Language
(GTL)

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ODS and Statistical Graphics

Statistical Graphics-Enabled Procedures in SAS 9.2 Software

| Base | SAS/STAT | SAS/QC | SAS/ETS | |
|------------|-----------|-----------|-------------|------------|
| CORR | ANOVA | MI | ANOM | ARIMA |
| FREQ | BOXPLOT | MIXED | CAPABILITY | AUTOREG |
| UNIVARIATE | CALIS | MULTTEST | CUSUM | ENTROPY |
| | CLUSTER | NPAR1WAY | MACONTROL | EXPAND |
| | CORRESP | PHREG | PARETO | MODEL |
| | FACTOR | PLS | RELIABILITY | PANEL |
| | FREQ | PRINCOMP | SHEWHART | RISK |
| | GAM | PRINQUAL | | SIMILARITY |
| | GENMOD | PROBIT | | SYSLIN |
| | GLIMMIX | QUANTREG | | TIMESERIES |
| | GLM | REG | | UCM |
| | GLMSELECT | ROBUSTREG | | VARMAX |
| | KDE | RSREG | | X12 |
| | KRIGE2D | SEQDESIGN | | |
| | LIFEREG | SEQTEST | | |
| | LIFETEST | SIM2D | | |
| | LOESS | TCALIS | | |
| | LOGISTIC | TRANSREG | | |
| | MCMC | TTEST | | |
| | MDS | VARIOGRAM | | |

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ODS and Statistical Graphics

- In addition to the graphics-enabled Procedures listed on the previous slide, there are four new “SG” [Statistical Graphics] Procedures in SAS/GRAPH Software
 - **SGPLOT**
 - **SGSCATTER**
 - **SGPANEL**
 - **SGRENDER**

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● ● ● ODS Graphics in SAS 9.2

> Key Concepts for Statistical Graphics

- ODS GRAPHICS ON; statement is REQUIRED to generate graphics
 - Without it, no graphs are produced
- Each graph-enabled PROC generates its own “suite” of images, depending on the analyses performed by that Procedure
 - PLOTS statement common to all analytical procedures supporting statistical graphics, but specifications vary across procedures
 - Some images generated automatically, others require use of the PLOTS option
 - Images generated as function of PROC, Statements, Options you supply

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● ● ● ODS Graphics in SAS 9.2

> Key concepts, continued

- Images can be delivered to the following ODS destinations:
 - **HTML, PDF, PS, RTF, LATEX, PCL, LISTING**
- Style Templates:
 - Control appearance of output
 - 53 SAS-supplied templates in 9.2 Phase One
- Graph Template Language
 - Used to generate templates for statistical graphics
 - Used within a PROC TEMPLATE step to create customized graph templates when “persistent” changes to output is required
- Graphics Editor
 - Used to modify appearance of individual graphics using a point-and-click graphical interface. Best for ad-hoc changes to a small number of images.

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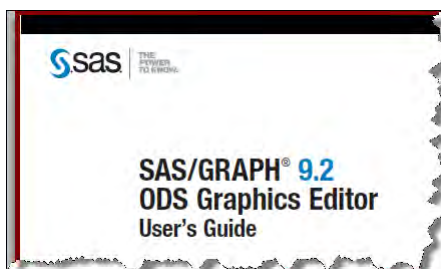
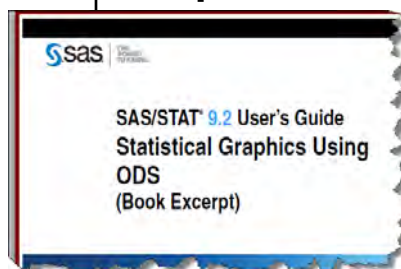
Learning More About Stat Graphics

- **Documentation: Free PDFs available for download at support.sas.com**
 - SAS/GRAPH 9.2 Statistical Graphics Procedures Guide
 - SAS/STAT 9.2 User's Guide: Statistical Graphics Users Guide (Book Excerpt)
 - Section of SAS/STAT Document manuals addressing Stat Graphics
 - SAS/GRAPH 9.2 ODS Graphics Editor User's Guide
 - Procedure-specific documentation

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Learning More About ODS Stat Graphics



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Thanks for Attending My Presentation !

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