Updated for V8

Producing Tables with SAS

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Course Description

This course shows you how to use the two tools that the SAS System provides to create tabular reports. These tools are the procedures:

- FREQ
- TABULATE

Specifically, you will learn how to:

- specify the layout of the table
- request counts, percentages, sums and statistical tests
- apply formats and labels
- customize the elements of the table
- create a SAS data set from the resulting table
- copy tables to other applications
- use new options available in version 8

Documentation

For PROC FREQ:

- SAS Procedures Guide, Version 6
- SAS/STAT User's Guide, Volume 1, Version 6
- SAS/STAT Software: Changes and Enhancements, through Release 6.11 (or 6.12)
- SAS/STAT Software: Changes and Enhancements, for Release 6.12

For PROC TABULATE:

- SAS Procedures Guide, Version 6
- SAS Guide to TABULATE Processing

View the SAS OnlineDoc, Version 8, in our website:

http://statsoft.nih.gov

The Sample Data Set: PATIENTS

PATID	CENTER	DOSE	RACE	SEX	HEIGHT	WEIGHT
101	A	5 mg	2	1	70	176
102	A	5 mg	2	1	73	240
103	A	5 mg	1	1	70	202
105	A	5 mg	3	1	68	154
109	A	10 mg	2	1	74	266
125	A	10 mg	1	2	65	140
150	A	10 mg	1	1	65	193
151	A	10 mg	2	2	69	175
168	A	10 mg	4	1	69	217
176	A	15 mg	1	2	64	171
189	A	15 mg	1	1	65	157
209	A	15 mg	1	2	60	169
222	A	15 mg	4	1	69	161
223	B	5 mg	1	1	71	220
245	B	5 mg	1	1	68	195
268	B	5 mg	1	2	64	172
271	B	5 mg	1	2	68	173
277	B	5 mg	4	1	70	179
279	B	10 mg	1	2	63	181
286	B	10 mg	1	1	72	175
297	B	10 mg	1	1	66	186
309	B	10 mg	4	2	64	194
315	B	10 mg	4	2	63	177
330	B	10 mg	1	2	65	182
401	B	15 mg	1	1	71	220
405	B	15 mg	1	1	69	174
407	B	15 mg	3	1	68	158
412	B	15 mg	1	1	74	210
413	B	15 mg	5	1	68	179
422	B	15 mg	4	1	71	197

The FREQ Procedure

Is a procedure available in Base SAS that allows you to build simple tables. You can specify:

- variables to include in the table
- percentages and statistical tests to calculate
- the format of the table
- an output SAS data set to save the statistics

PROC FREQ Statements

PROC	invokes the procedure and specifies options
TABLE	describes the table to produce
WEIGHT	assigns weights to the observations
OUTPUT	creates an output SAS data set with statistics computed by PROC FREQ

A Simple PROC FREQ

```
proc freq;
run;
```

The statements above produce one-way tables for <u>all</u> the variables of a data set. This includes continuous variables.

If your data set has many variables you should use the TABLE statement to specify the tables to produce.

One-Way Table of Character Variables

```
proc freq;
 table sex center;
run;
```

```
                                Cumulative  Cumulative
SEX   Frequency   Percent   Frequency    Percent
ffffffffffffffffffffffffffffffffffffffffffffffffff
  1         20      66.7          20       66.7
  2         10      33.3          30      100.0




                                  Cumulative  Cumulative
CENTER   Frequency   Percent   Frequency    Percent
ffffffffffffffffffffffffffffffffffffffffffffffffff
A              13      43.3          13       43.3
B              17      56.7          30      100.0
```

One-Way Table of Numeric Variables

```
proc freq;
 table height;
run;
```

HEIGHT	Frequency	Percent	Cumulative Frequency	Cumulative Percent
60	1	3.3	1	3.3
62	1	3.3	2	6.7
63	1	3.3	3	10.0
64	2	6.7	5	16.7
65	5	16.7	10	33.3
66	2	6.7	12	40.0
67	1	3.3	13	43.3
68	4	13.3	17	56.7
69	3	10.0	20	66.7
70	4	13.3	24	80.0
71	2	6.7	26	86.7
72	1	3.3	27	90.0
74	3	10.0	30	100.0

Using Formats

```
proc format;
 value ht low-60   = 'Small'
          60-72   = 'Medium'
          72-high = 'Tall';
run;

proc freq;
 table height;
 format height ht.;
run;
```

HEIGHT	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Small	1	3.3	1	3.3
Medium	26	86.7	27	90.0
Tall	3	10.0	30	100.0

Two-Way Table

```
proc freq;
 table race*sex;
run;
```

```
TABLE OF RACE BY SEX

RACE      SEX

Frequency,
Percent  ,
Row Pct  ,
Col Pct  ,       1,       2,  Total
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       1 ,     10 ,      7 ,     17
         ,  33.33 ,  23.33 ,  56.67
         ,  58.82 ,  41.18 ,
         ,  50.00 ,  70.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       2 ,      3 ,      1 ,      4
         ,  10.00 ,   3.33 ,  13.33
         ,  75.00 ,  25.00 ,
         ,  15.00 ,  10.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       3 ,      2 ,      0 ,      2
         ,   6.67 ,   0.00 ,   6.67
         , 100.00 ,   0.00 ,
         ,  10.00 ,   0.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       4 ,      4 ,      2 ,      6
         ,  13.33 ,   6.67 ,  20.00
         ,  66.67 ,  33.33 ,
         ,  20.00 ,  20.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       5 ,      1 ,      0 ,      1
         ,   3.33 ,   0.00 ,   3.33
         , 100.00 ,   0.00 ,
         ,   5.00 ,   0.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
Total          20       10       30
            66.67    33.33   100.00
```

Three-Way Table

```
TABLE 1 OF RACE BY SEX
CONTROLLING FOR CENTER=A

RACE      SEX

Frequency,
Percent  ,
Row Pct  ,
Col Pct  ,       1,       2,  Total
ffffffffˆffffffffˆffffffffˆ
       1 ,      3 ,      3 ,      6
         ,  23.08 ,  23.08 ,  46.15
         ,  50.00 ,  50.00 ,
         ,  33.33 ,  75.00 ,
ffffffffˆffffffffˆffffffffˆ
       2 ,      3 ,      1 ,      4
         ,  23.08 ,   7.69 ,  30.77
         ,  75.00 ,  25.00 ,
         ,  33.33 ,  25.00 ,
ffffffffˆffffffffˆffffffffˆ
       3 ,      1 ,      0 ,      1
         ,   7.69 ,   0.00 ,   7.69
         , 100.00 ,   0.00 ,
         ,  11.11 ,   0.00 ,
ffffffffˆffffffffˆffffffffˆ
       4 ,      2 ,      0 ,      2
         ,  15.38 ,   0.00 ,  15.38
         , 100.00 ,   0.00 ,
         ,  22.22 ,   0.00 ,
ffffffffˆffffffffˆffffffffˆ
       5 ,      0 ,      0 ,      0
         ,   0.00 ,   0.00 ,   0.00
         ,      . ,      . ,
         ,   0.00 ,   0.00 ,
ffffffffˆffffffffˆffffffffˆ
Total           9        4       13
             69.23    30.77   100.00
```

```
proc freq;
 table center*race*sex;
run;
```

This TABLE statement will produce one table for each value of the variable CENTER.
This is the table for CENTER=A.
The tables are produced in alphabetical order by the variable CENTER.

Using the BY Statement

```
CENTER=A

TABLE OF RACE BY SEX

RACE      SEX

Frequency,
Percent  ,
Row Pct  ,
Col Pct  ,       1,       2,  Total
ffffffffˆffffffffˆffffffffˆ
       1 ,      3 ,      3 ,      6
         ,  23.08 ,  23.08 ,  46.15
         ,  50.00 ,  50.00 ,
         ,  33.33 ,  75.00 ,
ffffffffˆffffffffˆffffffffˆ
       2 ,      3 ,      1 ,      4
         ,  23.08 ,   7.69 ,  30.77
         ,  75.00 ,  25.00 ,
         ,  33.33 ,  25.00 ,
ffffffffˆffffffffˆffffffffˆ
       3 ,      1 ,      0 ,      1
         ,   7.69 ,   0.00 ,   7.69
         , 100.00 ,   0.00 ,
         ,  11.11 ,   0.00 ,
ffffffffˆffffffffˆffffffffˆ
       4 ,      2 ,      0 ,      2
         ,  15.38 ,   0.00 ,  15.38
         , 100.00 ,   0.00 ,
         ,  22.22 ,   0.00 ,
ffffffffˆffffffffˆffffffffˆ
Total           9        4       13
            69.23    30.77   100.00
```

```
proc sort out=pat1;
 by center;
run;

proc freq data=pat1;
 table race*sex;
 by center;
run;
```

In order to use the BY statement the data set must first be sorted.
These statements will produce one table for each value of the variable CENTER.
This is the table for CENTER=A.

The PAGE Option

```
proc freq page;
 table sex dose;
run;
```

Requests that only one table be printed per page. By default, SAS prints the next table on the same page if there is enough space to print the complete table.

First Page

```
                                Cumulative  Cumulative
SEX   Frequency   Percent   Frequency    Percent
ffffffffffffffffffffffffffffffffffffffffffffffffffff
  1         20      66.7          20       66.7
  2         10      33.3          30      100.0
```

Second Page

```
                                Cumulative  Cumulative
DOSE    Frequency   Percent   Frequency    Percent
ffffffffffffffffffffffffffffffffffffffffffffffffffff
10 mg         11      36.7          11       36.7
15 mg         10      33.3          21       70.0
5 mg           9      30.0          30      100.0
```

The COMPRESS Option

Includes the next one-way frequency table on the same page if there is enough space to begin the table.

```
proc freq compress;
 table weight patid;
run;
```

First Page

WEIGHT	Frequency	Percent	Cumulative Frequency	Cumulative Percent
142	2	6.7	2	6.7
153	1	3.3	3	10.0
155	1	3.3	4	13.3
166	2	6.7	6	20.0
170	1	3.3	7	23.3
171	1	3.3	8	26.7
172	2	6.7	10	33.3
173	2	6.7	12	40.0
174	1	3.3	13	43.3
176	1	3.3	14	46.7
177	2	6.7	16	53.3
182	1	3.3	17	56.7
188	2	6.7	19	63.3
192	2	6.7	21	70.0
194	1	3.3	22	73.3
197	1	3.3	23	76.7
201	1	3.3	24	80.0
211	1	3.3	25	83.3
212	1	3.3	26	86.7
217	1	3.3	27	90.0
224	1	3.3	28	93.3
249	1	3.3	29	96.7
254	1	3.3	30	100.0

PATID	Frequency	Percent	Cumulative Frequency	Cumulative Percent
101	1	3.3	1	3.3
102	1	3.3	2	6.7
103	1	3.3	3	10.0
105	1	3.3	4	13.3
109	1	3.3	5	16.7
125	1	3.3	6	20.0
150	1	3.3	7	23.3
151	1	3.3	8	26.7
168	1	3.3	9	30.0
176	1	3.3	10	33.3
189	1	3.3	11	36.7
209	1	3.3	12	40.0
222	1	3.3	13	43.3
223	1	3.3	14	46.7
245	1	3.3	15	50.0
268	1	3.3	16	53.3
271	1	3.3	17	56.7
277	1	3.3	18	60.0
279	1	3.3	19	63.3
286	1	3.3	20	66.7
297	1	3.3	21	70.0
309	1	3.3	22	73.3
315	1	3.3	23	76.7
330	1	3.3	24	80.0
401	1	3.3	25	83.3
405	1	3.3	26	86.7
407	1	3.3	27	90.0
412	1	3.3	28	93.3

Second Page

PATID	Frequency	Percent	Cumulative Frequency	Cumulative Percent
413	1	3.3	29	96.7
422	1	3.3	30	100.0

The LIST Option

Requests that the table be printed in list form.

```
proc freq;
 table race*sex / list;
run;
```

RACE	SEX	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	1	10	33.3	10	33.3
1	2	7	23.3	17	56.7
2	1	3	10.0	20	66.7
2	2	1	3.3	21	70.0
3	1	2	6.7	23	76.7
4	1	4	13.3	27	90.0
4	2	2	6.7	29	96.7
5	1	1	3.3	30	100.0

The SPARSE Option

Requests printing of all possible combinations of levels of the variables in the table, even if some combinations do not occur in the data. This option affects output produced by the LIST option and output SAS data sets.

```
proc freq;
 table race*sex / list sparse;
run;
```

RACE	SEX	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	1	10	33.3	10	33.3
1	2	7	23.3	17	56.7
2	1	3	10.0	20	66.7
2	2	1	3.3	21	70.0
3	1	2	6.7	23	76.7
3	2	0	0.0	23	76.7
4	1	4	13.3	27	90.0
4	2	2	6.7	29	96.7
5	1	1	3.3	30	100.0
5	2	0	0.0	30	100.0

Eliminating Percentages

```
proc freq;
 table race*sex / norow nocol nopct;
run;
```

```
TABLE OF RACE BY SEX

RACE      SEX

Frequency,       1,       2,  Total
ffffffffˆffffffffˆffffffffˆ
       1 ,     10 ,      7 ,     17
ffffffffˆffffffffˆffffffffˆ
       2 ,      3 ,      1 ,      4
ffffffffˆffffffffˆffffffffˆ
       3 ,      2 ,      0 ,      2
ffffffffˆffffffffˆffffffffˆ
       4 ,      4 ,      2 ,      6
ffffffffˆffffffffˆffffffffˆ
       5 ,      1 ,      0 ,      1
ffffffffˆffffffffˆffffffffˆ
Total          20       10       30
```

Eliminating Separators

```
proc freq formchar(1,2,7)='   ';
 table race*sex / norow nocol nopct;
run;
```

The three characters are used to denote: the vertical divider, the horizontal divider, and the vertical-horizontal intersection

```
TABLE OF RACE BY SEX

RACE      SEX

Frequency        1        2   Total

       1        10        7       17

       2         3        1        4

       3         2        0        2

       4         4        2        6

       5         1        0        1

Total           20       10       30
```

Requesting Multiple Tables

You can request more than one table with one PROC FREQ by

- including a TABLE statement for each table
- including multiple table requests in one TABLE statement

You can use parenthesis as shown in the second TABLE statement below to request multiple tables.

```
proc freq;
 table race*sex race*dose;
 table race*(sex dose);
run;
```

Saving Results in a SAS Data Set

```
proc freq noprint;
 table center / out=ncenter;
run;

proc print data=ncenter;
run;
```

NOPRINT requests that no printed output be produced.
OUT= specifies the name of the output SAS data set. The data set contains the variables: COUNT (the frequency) and PERCENT (the percentage).

OBS	CENTER	COUNT	PERCENT
1	A	13	43.3333
2	B	17	56.6667

Including Percentages in a SAS Data Set

```
proc freq noprint;
 table center*sex / out=ncenter outpct;
run;

proc print data=ncenter;
run;
```

OUTPCT requests these variables:

PCT_ROW the row percentage

PCT_COL the column percentage

OBS	CENTER	SEX	COUNT	PERCENT	PCT_ROW	PCT_COL
1	A	1	9	30.0000	69.2308	45
2	A	2	4	13.3333	30.7692	40
3	B	1	11	36.6667	64.7059	55
4	B	2	6	20.0000	35.2941	60

Ordering by Internal Value

```
proc freq order=internal; *default;
 table center;
run;
```

```
                                  Cumulative  Cumulative
CENTER   Frequency   Percent   Frequency    Percent
ffffffffffffffffffffffffffffffffffffffffffffffffffffff
A              13      43.3          13       43.3
B              17      56.7          30      100.0
```

Ordering by Frequency Count

```
proc freq order=freq;
 table center;
run;
```

```
                                             Cumulative  Cumulative
CENTER   Frequency   Percent   Frequency    Percent
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
B                 17      56.7            17        56.7
A                 13      43.3            30       100.0
```

Ordering by the Order the Values Appear in the Data Set

```
proc freq order=data;
 table center;
run;
```

```
                                   Cumulative  Cumulative
CENTER   Frequency   Percent   Frequency    Percent
ffffffffffffffffffffffffffffffffffffffffffffffffffffff
A              13      43.3          13       43.3
B              17      56.7          30      100.0
```

Ordering by the Formatted Values

```
proc format;
 value $ctr 'A'='NIH’
            'B'='CDC';
run;
```

```
proc freq order=formatted;
 table center;
 format center $ctr.;
run;
```

CENTER	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CDC	17	56.7	17	56.7
NIH	13	43.3	30	100.0

Missing Values

Are not included, by default.

```
•This program adds a new a new patient with
 race missing;
data newpat;
 patid=123; race=.; sex=2;
run;

data pat2;
 set patients newpat;
run;

proc freq data=pat2;
 table sex*race;
run;
```

```
TABLE OF SEX BY RACE

SEX       RACE

Frequency,
Percent  ,
Row Pct  ,
Col Pct  ,       1,       2,       3,       4,       5,  Total
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       1 ,     10 ,      3 ,      2 ,      4 ,      1 ,     20
         ,  33.33 ,  10.00 ,   6.67 ,  13.33 ,   3.33 ,  66.67
         ,  50.00 ,  15.00 ,  10.00 ,  20.00 ,   5.00 ,
         ,  58.82 ,  75.00 , 100.00 ,  66.67 , 100.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       2 ,      7 ,      1 ,      0 ,      2 ,      0 ,     10
         ,  23.33 ,   3.33 ,   0.00 ,   6.67 ,   0.00 ,  33.33
         ,  70.00 ,  10.00 ,   0.00 ,  20.00 ,   0.00 ,
         ,  41.18 ,  25.00 ,   0.00 ,  33.33 ,   0.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
Total          17        4        2        6        1       30
            56.67    13.33     6.67    20.00     3.33   100.00

Frequency Missing = 1
```

Printing Missing Values

```
proc freq data=pat2;
 table sex*race / missprint;
run;
```

```
TABLE OF SEX BY RACE

SEX       RACE

Frequency,
Percent  ,
Row Pct  ,
Col Pct  ,       .,       1,       2,       3,       4,       5,  Total
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       1 ,      0 ,     10 ,      3 ,      2 ,      4 ,      1 ,     20
         ,      . ,  33.33 ,  10.00 ,   6.67 ,  13.33 ,   3.33 ,  66.67
         ,      . ,  50.00 ,  15.00 ,  10.00 ,  20.00 ,   5.00 ,
         ,      . ,  58.82 ,  75.00 , 100.00 ,  66.67 , 100.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
       2 ,      1 ,      7 ,      1 ,      0 ,      2 ,      0 ,     10
         ,      . ,  23.33 ,   3.33 ,   0.00 ,   6.67 ,   0.00 ,  33.33
         ,      . ,  70.00 ,  10.00 ,   0.00 ,  20.00 ,   0.00 ,
         ,      . ,  41.18 ,  25.00 ,   0.00 ,  33.33 ,   0.00 ,
ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ
Total           .      17        4        2        6        1       30
                .    56.67    13.33     6.67    20.00     3.33   100.00

Frequency Missing = 1
```

Including Missing Values in the Percentages

```
proc freq data=pat2;
 table sex*race / missing;
run;
```

```
TABLE OF SEX BY RACE

SEX       RACE

Frequency,
Percent  ,
Row Pct  ,
Col Pct  ,        .,       1,       2,       3,       4,       5,  Total
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
       1 ,      0 ,     10 ,      3 ,      2 ,      4 ,      1 ,     20
         ,   0.00 ,  32.26 ,   9.68 ,   6.45 ,  12.90 ,   3.23 ,  64.52
         ,   0.00 ,  50.00 ,  15.00 ,  10.00 ,  20.00 ,   5.00 ,
         ,   0.00 ,  58.82 ,  75.00 , 100.00 ,  66.67 , 100.00 ,
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
       2 ,      1 ,      7 ,      1 ,      0 ,      2 ,      0 ,     11
         ,   3.23 ,  22.58 ,   3.23 ,   0.00 ,   6.45 ,   0.00 ,  35.48
         ,   9.09 ,  63.64 ,   9.09 ,   0.00 ,  18.18 ,   0.00 ,
         , 100.00 ,  41.18 ,  25.00 ,   0.00 ,  33.33 ,   0.00 ,
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
Total           1       17        4        2        6        1       31
             3.23    54.84    12.90     6.45    19.35     3.23   100.00
```

Assigning Weights

```
data counts;
 input n @@;
cards;
1 1 1 1 1
2 1 1 1 1
1 1 5 2 1
1 1 1 4 3
1 0 0 1 1
1 1 1 1 1
;
```

```
data visits;
  merge patients counts;
run;

proc freq data=visits;
 table sex*race;
 weight n;
run;
```

```
TABLE OF SEX BY RACE

SEX       RACE

Frequency,
Percent  ,
Row Pct  ,
Col Pct  ,       1,       2,       3,       4,       5,  Total
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
       1 ,     13 ,      3 ,      2 ,      8 ,      1 ,     27
         ,  33.33 ,   7.69 ,   5.13 ,  20.51 ,   2.56 ,  69.23
         ,  48.15 ,  11.11 ,   7.41 ,  29.63 ,   3.70 ,
         ,  54.17 ,  75.00 , 100.00 , 100.00 , 100.00 ,
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
       2 ,     11 ,      1 ,      0 ,      0 ,      0 ,     12
         ,  28.21 ,   2.56 ,   0.00 ,   0.00 ,   0.00 ,  30.77
         ,  91.67 ,   8.33 ,   0.00 ,   0.00 ,   0.00 ,
         ,  45.83 ,  25.00 ,   0.00 ,   0.00 ,   0.00 ,
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
Total          24        4        2        8        1       39
            61.54    10.26     5.13    20.51     2.56   100.00
```

Chi-Square Statistic

```
proc freq;
 table sex*race / chisq
        norow nocol nopct;
run;
```

```
TABLE OF SEX BY RACE

SEX       RACE

Frequency,       1,       2,       3,       4,       5,  Total
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
       1 ,     10 ,      3 ,      2 ,      4 ,      1 ,     20
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
       2 ,      7 ,      1 ,      0 ,      2 ,      0 ,     10
ffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆ
Total          17        4        2        6        1       30


STATISTICS FOR TABLE OF SEX BY RACE

Statistic                     DF     Value        Prob
ffffffffffffffffffffffffffffffffffffffffffffffffffffff
Chi-Square                     4     2.096       0.718
Likelihood Ratio Chi-Square    4     3.019       0.555
Mantel-Haenszel Chi-Square     1     0.753       0.386
Phi Coefficient                      0.264
Contingency Coefficient              0.256
Cramer's V                           0.264

Sample Size = 30
WARNING: 80% of the cells have expected counts less than 5. Chi-Square
may not be a valid test.
```

Saving Statistics in a SAS Data Set

```
proc freq noprint;
 table sex*race / chisq;
 output out=stats chisq;
run;

proc print data=stats;
run;
```

OBS	N	_PCHI_	DF_PCHI	P_PCHI	_LRCHI_	DF_LRCHI	P_LRCHI	_MHCHI_	DF_MHCHI	P_MHCHI	_PHI_	_CONTGY_	_CRAMV_
1	30	2.09559	4	0.71818	3.01919	4	0.55462	0.75288	1	0.38556	0.26430	0.25552	0.26430

More Statistical Options

More statistical options of PROC FREQ are discussed in the course “Using PROC FREQ in the SAS System to Perform Categorical Data Analysis”.

You can view those course notes in the SSS website:

http://statsoft.nih.gov.

Workshop 1

Before you start the workshop, open and submit the program called

`C:\SASTAB\SETUP.SAS`

It includes a LIBNAME statement and a PROC FORMAT with the formats $CTR, SEX and RACE. Use the data set PATIENTS in all your procedures.

1. Create one-way tables of the variables CENTER, DOSE and WEIGHT.

2. Create a two-way table with CENTER as the rows and DOSE as the columns.

3. Modify the program from exercise 2 so values of DOSE appear in the following order: 5 mg, 10 mg, 15 mg.

Workshop 1

4. Modify the program from exercise 2 so the results appear in list form.

5. Modify the program from exercise 2 so no percentages or separators appear on the table.

6. Modify the program from exercise 2 to save the results in a SAS data set. Include counts and percentages in the data set.

The TABULATE Procedure

Is a procedure available in Base SAS that allows you to build tables. You can specify:

- variables to include in the table
- the format of the table
- labels and SAS formats to assign to the cells
- statistics and percentages to calculate
- denominator for percentages
- an output SAS data set to save the results
- more customization options than PROC FREQ

Classification Variable

- A variable that contains categories, id numbers or names.
- Not intended to be used in mathematical operations.
- Can be a SAS numeric or character variable.
- Examples:
  - drug group
  - grant category
  - social security number

Analysis Variable

- A variable that contains numerical values that can be used in mathematical operations.
- Must be a SAS numeric variable.
- Examples:
  - heart rate
  - dollar amount
  - population

PROC TABULATE Statements

PROC	invokes the procedure and specifies options
CLASS	identifies the classification variables
VAR	identifies the analysis variables
TABLE	describes the table to produce
KEYLABEL	specifies labels for keywords

CLASS Statement

Prior to Version 7:

CLASS *variables*;

Version 7 and above:

CLASS *variables / options*;

Some valid options are:

ASCENDING | DESCENDING

MISSING

ORDER=DATA | FORMATTED | FREQ | UNFORMATTED

Table of One Variable

```
proc tabulate;
 class sex;
 table sex;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,            SEX            ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰
,     1      ,     2      ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,     N      ,     N      ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       20.00,       10.00,
Šƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Concatenating Columns

```
proc tabulate;
 class sex dose;
 table sex dose;
run;
```

SEX		DOSE		
1	2	10 mg	15 mg	5 mg
N	N	N	N	N
20.00	10.00	11.00	10.00	9.00

Nesting Variables

```
proc tabulate;
 class sex dose;
 table sex*dose;
run;
```

SEX					
1			2		
DOSE			DOSE		
10 mg	15 mg	5 mg	10 mg	15 mg	5 mg
N	N	N	N	N	N
5.00	8.00	7.00	6.00	2.00	2.00

Two-Way Table

```
proc tabulate;
 class sex dose;
 table sex, dose;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                          ,                   DOSE                  ,
,                          ‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,                          ,   10 mg    ,   15 mg    ,    5 mg    ,
,                          ‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,                          ,     N      ,     N      ,     N      ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,SEX                       ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,
,1                         ,        5.00,        8.00,        7.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,2                         ,        6.00,        2.00,        2.00,
Šƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Two-Way Table with Concatenation

```
proc tabulate;
 class race sex dose;
 table race, sex dose;
run;
```

	SEX		DOSE		
	1	2	10 mg	15 mg	5 mg
	N	N	N	N	N
RACE					
1	10.00	7.00	6.00	6.00	5.00
2	3.00	1.00	2.00	.	2.00
3	2.00	.	.	1.00	1.00
4	4.00	2.00	3.00	2.00	1.00
5	1.00	.	.	1.00	.

Two-Way Table with Nesting

```
proc tabulate;
 class race sex dose;
 table race, sex*dose;
run;
```

	SEX					
	1			2		
	DOSE			DOSE		
	10 mg	15 mg	5 mg	10 mg	15 mg	5 mg
	N	N	N	N	N	N
RACE						
1	3.00	4.00	3.00	3.00	2.00	2.00
2	1.00	.	2.00	1.00	.	.
3	.	1.00	1.00	.	.	.
4	1.00	2.00	1.00	2.00	.	.
5	.	1.00	.	.	.	.

Page Dimension

```
proc tabulate;
 class sex race dose;
 table sex, race, dose;
run;
```

- By default, each table is displayed on a separate page.
- Use the CONDENSE option in the TABLE statement to display as many tables as will fit on a page.

Page Dimension (continued)

SEX 1

	DOSE		
	10 mg	15 mg	5 mg
	N	N	N
RACE			
1	3.00	4.00	3.00
2	1.00	.	2.00
3	.	1.00	1.00
4	1.00	2.00	1.00
5	.	1.00	.

SEX 2

	DOSE		
	10 mg	15 mg	5 mg
	N	N	N
RACE			
1	3.00	2.00	2.00
2	1.00	.	.
4	2.00	.	.

Assigning Labels

```
proc tabulate;
 class sex dose;
 table sex, dose;
 keylabel n=' ';
 label sex='Sex' dose='Dose';
run;
```

```
proc tabulate;
 class sex dose;
 table sex='Sex',dose='Dose'*n=' ';
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                         ,                  Dose                  ,
,                         ‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰
,                         ,   10 mg    ,   15 mg    ,    5 mg    ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Sex                      ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,
,1                        ,        5.00,        8.00,        7.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,2                        ,        6.00,        2.00,        2.00,
Šƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

The BOX= Option

```
proc tabulate;
 class sex dose;
 table sex, dose*n=' ' / box='Table 2.1';
run;
```

Set to:

PAGE	displays the value of the page variable
variable	displays the variable name or label
string	displays a string

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,Table 2.1                ,                  DOSE                  ,
,                         ‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰
,                         ,   10 mg    ,   15 mg    ,    5 mg    ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,SEX                      ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,
,1                        ,        5.00,        8.00,        7.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,2                        ,        6.00,        2.00,        2.00,
Šƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Assigning a Label to Missing Values

```
proc tabulate;
 class race sex;
 table race, sex / misstext='0';
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                         ,            SEX            ,
,                         ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,                         ,     1      ,     2      ,
,                         ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,                         ,     N      ,     N      ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,RACE                     ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰            ,            ,
,1                        ,       10.00,        7.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,2                        ,        3.00,        1.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,3                        ,        2.00,           0,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,4                        ,        4.00,        2.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,5                        ,        1.00,           0,
Šƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Listing Missing Categories

```
data pat2;
 set patients;
 if dose='5 mg' and sex=2 then delete;
run;

*default;
proc tabulate data=pat2;
 class sex dose;
 table sex='Sex'*dose='Dose'*n=' ';
run;
```

```
*with PRINTMISS;
proc tabulate data=pat2;
 class sex dose;
 table sex='Sex'*dose='Dose'*n=' ' /
       printmiss misstext='0';
run;
```

Sex				
1			2	
Dose			Dose	
10 mg	15 mg	5 mg	10 mg	15 mg
5.00	8.00	7.00	6.00	2.00

Sex					
1			2		
Dose			Dose		
10 mg	15 mg	5 mg	10 mg	15 mg	5 mg
5.00	8.00	7.00	6.00	2.00	0

Modifying the Size of the Row Title

```
proc tabulate;
 class race sex dose;
 table race='Race',
       sex='Sex'*dose='Dose'*n=' ' /
       misstext='0' rts=6;
run;
```

	Sex					
	1			2		
	Dose			Dose		
	10 mg	15 mg	5 mg	10 mg	15 mg	5 mg
Race						
1	3.00	4.00	3.00	3.00	2.00	2.00
2	1.00	0	2.00	1.00	0	0
3	0	1.00	1.00	0	0	0
4	1.00	2.00	1.00	2.00	0	0
5	0	1.00	0	0	0	0

Assigning Formats to All Cell Values

```
proc tabulate format=8.;
 class race sex dose;
 table race='Race',
       sex='Sex'*dose='Dose'*n=' ' /
       misstext='0' rts=9;
run;
```

```
„fffffff…fffffffffffffffffffffffffffffffffffffffffffffffffffff†
,       ,                         Sex                         ,
,       ‡ffffffffffffffffffffffffff…ffffffffffffffffffffffffff‰
,       ,            1             ,            2             ,
,       ‡ffffffffffffffffffffffffffˆffffffffffffffffffffffffff‰
,       ,           Dose           ,           Dose           ,
,       ‡ffffffff…ffffffff…ffffffffˆffffffff…ffffffff…ffffffff‰
,       , 10 mg  , 15 mg  ,  5 mg  , 10 mg  , 15 mg  ,  5 mg  ,
‡fffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffff‰
,Race   ,        ,        ,        ,        ,        ,        ,
‡fffffff‰        ,        ,        ,        ,        ,        ,
,1      ,       3,       4,       3,       3,       2,       2,
‡fffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffff‰
,2      ,       1,       0,       2,       1,       0,       0,
‡fffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffff‰
,3      ,       0,       1,       1,       0,       0,       0,
‡fffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffff‰
,4      ,       1,       2,       1,       2,       0,       0,
‡fffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffffˆffffffff‰
,5      ,       0,       1,       0,       0,       0,       0,
Šffffff‹ffffffff‹ffffffff‹ffffffff‹ffffffff‹ffffffff‹fffffffŒ
```

Assigning Formats to Selected Cell Values

```
proc tabulate;
 class sex dose;
 table sex*f=8. dose;
 keylabel n=' ';
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,       SEX       ,                 DOSE                 ,
‡ƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰
,   1    ,   2    ,   10 mg    ,   15 mg    ,    5 mg    ,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,      20,      10,       11.00,       10.00,        9.00,
Šƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Assigning Formats to Variables

```
proc format;
 value sex  1='Male'
            2='Female';
 value race 1='Caucasian'
            2='Black'
            3='Hispanic'
            4='Asian'
            5='Other';
run;

proc tabulate format=8.;
 class race sex dose;
 table race, sex*dose*n=' ' /
       misstext='0' rts=12;
 format race race. sex sex.;
run;
```

	SEX					
	Male			Female		
	DOSE			DOSE		
RACE	10 mg	15 mg	5 mg	10 mg	15 mg	5 mg
Caucasian	3	4	3	3	2	2
Black	1	0	2	1	0	0
Hispanic	0	1	1	0	0	0
Asian	1	2	1	2	0	0
Other	0	1	0	0	0	0

Ordering Values

You can order the values of the class variables in the same order that you can with PROC FREQ. To order the values use the ORDER= option in the PROC TABULATE statement or in the CLASS statement. Valid values are:

- UNFORMATTED by the internal values (default)
- FREQ by descending frequency count
- FORMATTED by the formatted value
- DATA by the order they appear in data set

Ordering By Formatted Value

The ORDER= option in the PROC TABULATE statement applies to all class variables.

```
proc format;
 value sex  1='Male'
            2='Female';
 value race 1='Caucasian'
            2='Black'
            3='Hispanic'
            4='Asian'
            5='Other';
 value $dose '5 mg' = ' 5 mg';
run;

proc tabulate format=8.
     order=formatted;
 class sex dose race;
 table race, sex*dose*n=' ' /
       misstext='0' rts=12;
 format sex sex. race race.
        dose $dose.;
run;
```

	SEX					
	Female			Male		
	DOSE			DOSE		
	5 mg	10 mg	15 mg	5 mg	10 mg	15 mg
RACE						
Asian	0	2	0	1	1	2
Black	0	1	0	2	1	0
Caucasian	2	3	2	3	3	4
Hispanic	0	0	0	1	0	1
Other	0	0	0	0	0	1

Ordering By Formatted Value (V 7 and 8)

The ORDER= option in the CLASS statement applies to only that variable. This is valid only under version 7 and 8.

```
proc tabulate format=8.;
 class sex dose / order=formatted;
 class race;
 table race, sex*dose*n=' ' /
       misstext='0' rts=12;
 format sex sex. race race.
        dose $dose.;
run;
```

	SEX					
	Female			Male		
	DOSE			DOSE		
RACE	5 mg	10 mg	15 mg	5 mg	10 mg	15 mg
Caucasian	2	3	2	3	3	4
Black	0	1	0	2	1	0
Hispanic	0	0	0	1	0	1
Asian	0	2	0	1	1	2
Other	0	0	0	0	0	1

Eliminating Horizontal Separators

```
proc tabulate noseps;
 class race sex dose;
 table dose='Dose'*race='Race',
       sex='Sex'*n=' '*f=6. /
       misstext='0' rts=20;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                  ,     Sex     ,
,                  ‡ƒƒƒƒƒƒ…ƒƒƒƒƒƒ‰
,                  , Male ,Female,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Dose     Race     ,      ,      ,
,10 mg    Caucasian,     3,     3,
,         Black    ,     1,     1,
,         Asian    ,     1,     2,
,15 mg    Caucasian,     4,     2,
,         Hispanic ,     1,     0,
,         Asian    ,     2,     0,
,         Other    ,     1,     0,
,5 mg     Caucasian,     3,     2,
,         Black    ,     2,     0,
,         Hispanic ,     1,     0,
,         Asian    ,     1,     0,
Šƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒŒ
```

Eliminating All Separators

```
proc tabulate formchar='                    ';
 class race sex dose;
 table dose='Dose'*race='Race',
       sex='Sex'*n=' '*f=6. /
       misstext='0' rts=20;
 format race race. sex sex.;
run;
```

		Sex	
		Male	Female
Dose	Race		
10 mg	Caucasian	3	3
	Black	1	1
	Asian	1	2
15 mg	Caucasian	4	2
	Hispanic	1	0
	Asian	2	0
	Other	1	0
5 mg	Caucasian	3	2
	Black	2	0
	Hispanic	1	0
	Asian	1	0

The string specifies 11 characters. They represent the two bar characters, vertical and horizontal, and the nine corner characters: upper left, upper middle, upper right, middle left, middle middle (cross), middle right, lower left, lower middle, and lower right.

Indenting Row Values

```
proc tabulate noseps;
 class race sex dose;
 table dose*race,
       sex*n=' '*f=6. /
       misstext='0' rts=14 indent=3;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,            ,     SEX     ,
,            ‡ƒƒƒƒƒƒ…ƒƒƒƒƒƒ‰
,            , Male ,Female,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,10 mg       ,      ,      ,
,   Caucasian,     3,     3,
,   Black    ,     1,     1,
,   Asian    ,     1,     2,
,15 mg       ,      ,      ,
,   Caucasian,     4,     2,
,   Hispanic ,     1,     0,
,   Asian    ,     2,     0,
,   Other    ,     1,     0,
,5 mg        ,      ,      ,
,   Caucasian,     3,     2,
,   Black    ,     2,     0,
,   Hispanic ,     1,     0,
,   Asian    ,     1,     0,
Šƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒŒ
```

Workshop 2

In these exercises you are asked to produce tables like the ones shown here. Try to make them look as similar to these as possible.

1. Create separate one-way tables of the variables CENTER and DOSE.

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,          CENTER           ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰
,     A      ,     B      ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       13.00,       17.00,
Šƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                  DOSE                  ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰
,   10 mg    ,   15 mg    ,    5 mg    ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       11.00,       10.00,        9.00,
Šƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Workshop 2

2. Create a two-way table with DOSE as the row dimension and CENTER as the column dimension as shown below.

```
„ffffff…ffffffffffffff†
,      ,   Center    ,
,      ‡ffffff…ffffff‰
,      ,  A   ,  B   ,
‡ffffffˆffffffˆffffff‰
,Daily ,      ,      ,
,Dose  ,      ,      ,
‡ffffff‰      ,      ,
,10 mg ,     5,     6,
‡ffffffˆffffffˆffffff‰
,15 mg ,     4,     6,
‡ffffffˆffffffˆffffff‰
,5 mg  ,     4,     5,
Šffffff‹ffffff‹ffffffŒ
```

Workshop 2

3. Create a two-way table with RACE nested within SEX as the row dimension and DOSE as the column dimension. Include all races within each sex. Label missing values with a “0”.

		DAILY DOSE		
		10 mg	15 mg	5 mg
SEX	RACE			
Male	Caucasian	3	4	3
	Black	1	0	2
	Hispanic	0	1	1
	Asian	1	2	1
	Other	0	1	0
Female	Caucasian	3	2	2
	Black	1	0	0
	Hispanic	0	0	0
	Asian	2	0	0
	Other	0	0	0

Workshop 2

4. Modify the program in exercise 3, to eliminate horizontal separator lines from the row titles and the body of the table, and to indent the race values under the sex values.

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,             ,     DAILY DOSE     ,
,             ‡ƒƒƒƒƒƒ…ƒƒƒƒƒƒ…ƒƒƒƒƒƒ‰
,             ,10 mg ,15 mg , 5 mg ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Male         ,      ,      ,      ,
,   Caucasian ,     3,     4,     3,
,   Black     ,     1,     0,     2,
,   Hispanic  ,     0,     1,     1,
,   Asian     ,     1,     2,     1,
,   Other     ,     0,     1,     0,
,Female       ,      ,      ,      ,
,   Caucasian ,     3,     2,     2,
,   Black     ,     1,     0,     0,
,   Hispanic  ,     0,     0,     0,
,   Asian     ,     2,     0,     0,
,   Other     ,     0,     0,     0,
Šƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒŒ
```

Including an Analysis Variable

```
proc tabulate;
 class sex dose;
 var weight;
 table sex='Sex',
       dose='Dose'*weight / rts=9;
 format sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,       ,                 Dose                 ,
,       ‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       ,   10 mg    ,   15 mg    ,    5 mg    ,
,       ‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       ,   WEIGHT   ,   WEIGHT   ,   WEIGHT   ,
,       ‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       ,    SUM     ,    SUM     ,    SUM     ,
‡ƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Sex    ,            ,            ,            ,
‡ƒƒƒƒƒƒƒ‰            ,            ,            ,
,Male   ,     1037.00,     1456.00,     1366.00,
‡ƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Female ,     1049.00,      340.00,      345.00,
Šƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

VAR Statement

Prior to Version 7:

VAR *variables*;

Version 7 and above:

VAR *variables / options*;

Some valid options are:

WEIGHT= specifies a numeric variable whose values weight the values of the variables

Mean of Analysis Variable

```
proc tabulate;
 class sex dose;
 var weight;
 table sex='Sex',
       dose='Dose'*weight*mean / rts=9;
 format sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,       ,                 Dose                 ,
,       ‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       ,   10 mg    ,   15 mg    ,    5 mg    ,
,       ‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       ,   WEIGHT   ,   WEIGHT   ,   WEIGHT   ,
,       ‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,       ,    MEAN    ,    MEAN    ,    MEAN    ,
‡ƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Sex    ,            ,            ,            ,
‡ƒƒƒƒƒƒƒ‰            ,            ,            ,
,Male   ,      207.40,      182.00,      195.14,
‡ƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Female ,      174.83,      170.00,      172.50,
Šƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Statistics Available

Prior to Version 7:

CSS	CV	MAX	MEAN	MIN	PCTSUM
RANGE	STDDEV | STD		STDERR		SUM
N	NMISS	PCTN	SUMWGT		USS
VAR					

New with Version 7 and above:

MEDIAN | P50	P1	P5	P10	Q1 | P25
Q3 | P75	P90	P95	P99	QRANGE

New with Version 8:

COLPCTN	COLPCTSUM	PAGEPCTN	PAGEPCTSUM
REPPCTN	REPPCTSUM	ROWPCTN	ROWPCTSUM

More than one Analysis Variable

```
proc tabulate;
 class sex dose;
 var height weight;
 table sex='Sex',
       dose='Dose'*(height weight) / rts=9;
 format sex sex.;
run;
```

	Dose					
	10 mg		15 mg		5 mg	
	HEIGHT	WEIGHT	HEIGHT	WEIGHT	HEIGHT	WEIGHT
	SUM	SUM	SUM	SUM	SUM	SUM
Sex						
Male	346.00	1037.00	555.00	1456.00	490.00	1366.00
Female	389.00	1049.00	124.00	340.00	132.00	345.00

Including Statistics

```
proc tabulate;
 class sex dose;
 var height;
 table sex='Sex',
       dose='Dose'*height=' '*(n mean std sum)*f=6.2 / rts=9;
 format sex sex.;
run;
```

	Dose											
	10 mg				15 mg				5 mg			
	N	MEAN	STD	SUM	N	MEAN	STD	SUM	N	MEAN	STD	SUM
Sex												
Male	5.00	69.20	3.83	346.00	8.00	69.38	2.67	555.00	7.00	70.00	1.73	490.00
Female	6.00	64.83	2.23	389.00	2.00	62.00	2.83	124.00	2.00	66.00	2.83	132.00

Labeling the Statistics

```
proc tabulate;
 class sex dose;
 var height;
 table sex='Sex',
       dose='Dose'*height=' '*(n mean std sum)*f=6.2 / rts=10;
 keylabel n='n' mean='Mean' std='StdDev' sum='Sum';
 format sex sex.;
run;
```

	Dose											
	10 mg				15 mg				5 mg			
	n	Mean	StdDev	Sum	n	Mean	StdDev	Sum	n	Mean	StdDev	Sum
Sex												
Male	5.00	69.20	3.83	346.00	8.00	69.38	2.67	555.00	7.00	70.00	1.73	490.00
Female	6.00	64.83	2.23	389.00	2.00	62.00	2.83	124.00	2.00	66.00	2.83	132.00

Assigning Formats to the Statistics

```
proc tabulate;
 class sex dose;
 var height;
 table dose='Dose'*sex='Sex ',
       height=' '*(n*f=2. mean*f=6.2 std*f=6.2 sum*f=comma5.) /
       rts=19 printmiss;
 keylabel mean='Mean' std='StdDev' sum='Sum';
 format sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒ…ƒƒƒƒƒƒ…ƒƒƒƒƒƒ…ƒƒƒƒƒ†
,                  ,N , Mean ,StdDev, Sum ,
‡ƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒˆƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒ‰
,Dose    ,Sex     ,  ,      ,      ,     ,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒ‰  ,      ,      ,     ,
,10 mg   ,Male    , 5, 69.20,  3.83,  346,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒ‰
,        ,Female  , 6, 64.83,  2.23,  389,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒ‰
,15 mg   ,Male    , 8, 69.38,  2.67,  555,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒ‰
,        ,Female  , 2, 62.00,  2.83,  124,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒ‰
,5 mg    ,Male    , 7, 70.00,  1.73,  490,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒ‰
,        ,Female  , 2, 66.00,  2.83,  132,
Šƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒ‹ƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒŒ
```

Printing Totals

```
proc tabulate;
 class race sex;
 table race='Race' all,
       sex='Sex'*n=' ' / rts=12;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,          ,           Sex           ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,    Male    ,   Female   ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Race      ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒ‰            ,            ,
,Caucasian ,       10.00,        7.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Black     ,        3.00,        1.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Hispanic  ,        2.00,           .,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Asian     ,        4.00,        2.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Other     ,        1.00,           .,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,ALL       ,       20.00,       10.00,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Labeling the Totals

```
proc tabulate;
 class race sex;
 table race='Race' all='Column Total',
       sex='Sex' all='Row Total' / rts=14;
 keylabel n=' ';
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ†
,            ,           Sex           ,            ,
,            ‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰            ,
,            ,    Male    ,   Female   , Row Total  ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Race        ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,
,Caucasian   ,       10.00,        7.00,       17.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Black       ,        3.00,        1.00,        4.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Hispanic    ,        2.00,           .,        2.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Asian       ,        4.00,        2.00,        6.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Other       ,        1.00,           .,        1.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Column Total,       20.00,       10.00,       30.00,
Šƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Overall Percentages (Version 8)

```
proc tabulate;
 class race sex;
 table race='Race',
       sex='Sex'*(n reppctn) / rts=12;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,          ,                          Sex                           ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,          Male            ,          Female           ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,     N      ,  RepPctN   ,     N      ,  RepPctN   ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Race      ,            ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,            ,
,Caucasian ,       10.00,       33.33,        7.00,       23.33,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Black     ,        3.00,       10.00,        1.00,        3.33,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Hispanic  ,        2.00,        6.67,           .,           .,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Asian     ,        4.00,       13.33,        2.00,        6.67,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Other     ,        1.00,        3.33,           .,           .,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Row Percentages (Version 8)

```
proc tabulate;
 class race sex;
 table race='Race',
       sex='Sex'*(n rowpctn) / rts=12;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,          ,                          Sex                           ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,          Male            ,          Female           ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,     N      ,  RowPctN   ,     N      ,  RowPctN   ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Race      ,            ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,            ,
,Caucasian ,       10.00,       58.82,        7.00,       41.18,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Black     ,        3.00,       75.00,        1.00,       25.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Hispanic  ,        2.00,      100.00,           .,           .,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Asian     ,        4.00,       66.67,        2.00,       33.33,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Other     ,        1.00,      100.00,           .,           .,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Column Percentages (Version 8)

```
proc tabulate;
 class race sex;
 table race='Race',
       sex='Sex'*(n colpctn) / rts=12;
 format race race. sex sex.;
run;
```

	Sex			
	Male		Female	
	N	ColPctN	N	ColPctN
Race				
Caucasian	10.00	50.00	7.00	70.00
Black	3.00	15.00	1.00	10.00
Hispanic	2.00	10.00	.	.
Asian	4.00	20.00	2.00	20.00
Other	1.00	5.00	.	.

Overall Percentages (Prior to Version 8)

```
proc tabulate;
 class race sex;
 table race='Race',
       sex='Sex'*(n pctn) / rts=12;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,          ,                          Sex                            ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,          Male            ,          Female           ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,     N      ,    PCTN    ,     N      ,    PCTN    ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Race      ,            ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,            ,
,Caucasian ,       10.00,       33.33,        7.00,       23.33,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Black     ,        3.00,       10.00,        1.00,        3.33,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Hispanic  ,        2.00,        6.67,           .,           .,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Asian     ,        4.00,       13.33,        2.00,        6.67,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Other     ,        1.00,        3.33,           .,           .,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Row Percentages (Prior to Version 8)

```
proc tabulate;
 class race sex;
 table race='Race',
       sex='Sex'*(n pctn<sex>) / rts=12;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,          ,                          Sex                          ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,          Male            ,          Female          ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,     N      ,    PCTN    ,     N      ,    PCTN    ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Race      ,            ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,            ,
,Caucasian ,       10.00,       58.82,        7.00,       41.18,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Black     ,        3.00,       75.00,        1.00,       25.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Hispanic  ,        2.00,      100.00,           .,           .,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Asian     ,        4.00,       66.67,        2.00,       33.33,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Other     ,        1.00,      100.00,           .,           .,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

Column Percentages (Prior to Version 8)

```
proc tabulate;
 class race sex;
 table race='Race',
       sex='Sex'*(n pctn<race>) / rts=12;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,          ,                          Sex                            ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,          Male            ,          Female           ,
,          ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,          ,     N      ,    PCTN    ,     N      ,    PCTN    ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Race      ,            ,            ,            ,            ,
‡ƒƒƒƒƒƒƒƒƒƒ‰            ,            ,            ,            ,
,Caucasian ,       10.00,       50.00,        7.00,       70.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Black     ,        3.00,       15.00,        1.00,       10.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Hispanic  ,        2.00,       10.00,           .,           .,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Asian     ,        4.00,       20.00,        2.00,       20.00,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,Other     ,        1.00,        5.00,           .,           .,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒƒƒƒƒŒ
```

OUT= Option (V7 and above)

PROC TABULATE OUT=*datasetname*;

where *datasetname* specifies the output data set.

```
proc tabulate out=tabdata;
 class race sex;
 var weight;
 table race all, sex*weight*(n mean std);
 format race race. sex sex.;
run;

proc print data=tabdata;
run;
```

Obs	RACE	SEX	_TYPE_	_PAGE_	_TABLE_	WEIGHT_N	WEIGHT_ Mean	WEIGHT_ Std
1	Caucasian	Male	11	1	1	10	193.200	20.7139
2	Caucasian	Female	11	1	1	7	169.714	14.0204
3	Black	Male	11	1	1	3	227.333	46.3177
4	Black	Female	11	1	1	1	175.000	.
5	Hispanic	Male	11	1	1	2	156.000	2.8284
6	Asian	Male	11	1	1	4	188.500	24.0208
7	Asian	Female	11	1	1	2	185.500	12.0208
8	Other	Male	11	1	1	1	179.000	.
9	.	Male	01	1	1	20	192.950	29.4180
10	.	Female	01	1	1	10	173.400	13.8018

Copying Tables to Other Applications

- Eliminate the date and the page number and do not center the output. (Use the statement: `options nocenter nodate nonumber;`)
- Run the program.
- Mark the table you want to copy from the OUTPUT window .
- With the left mouse button, drag it to the target application, or use cut and paste.
- The text will retain the text formatting values (font, size, etc.) except color.

You can also SAVE the contents of the OUTPUT window to a text file or an RTF file. An RTF file retains attributes such as the font used. If saved as text you have to mark the table and change the font to SAS Monospace after opening with another application. You may also have to modify the font size so it fit on a page.

Copying Tables to Other Applications

An alternative for saving the tables as Excel files is to use the Output Delivery System in SAS, Version 8. First, create an HTML file using ODS then read it with Excel and save it as an Excel file.

The following program creates an HTML file that contains the table produced by TABULATE. Include an ODS HTML statement with the BODY= option before invoking PROC TABULATE. After the RUN statement add the ODS HTML statement with the CLOSE option.

```
ods html body='c:\table1.html';
proc tabulate;
 class race sex;
 table race='Race', sex='Sex'*(n colpctn) / rts=12;
 format race race. sex sex.;
run;
ods html close;
```

Note: The documentation for the Output Delivery System is available in our website:
`http://statsoft.nih.gov/pubs/onldoc.htm`

Workshop 3

1. Modify exercise 2 of workshop 2 so the table looks like this. The percentages denote row percentages.

```
„ffffffff…ffffffffffffffffffff†
,        ,       Center       ,
,        ‡ffffffffff…ffffffffff‰
,        ,   CDC    ,   NIH    ,
,        ‡ffff…fffff^ffff…fffff‰
,        , n  ,  %  , n  ,  %  ,
‡ffffffff^ffff^fffff^ffff^fffff‰
,Daily   ,    ,     ,    ,     ,
,Dose    ,    ,     ,    ,     ,
‡ffffffff‰    ,     ,    ,     ,
,5 mg    ,   5,55.56,   4,44.44,
‡ffffffff^ffff^fffff^ffff^fffff‰
,10 mg   ,   6,54.55,   5,45.45,
‡ffffffff^ffff^fffff^ffff^fffff‰
,15 mg   ,   6,60.00,   4,40.00,
Šffffffff‹ffff‹fffff‹ffff‹fffffŒ
```

Workshop 3

2. Create a two-way table of RACE against SEX displaying the average weight for each group as shown below. Include a row and a column that displays the overall average for each RACE and SEX.

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒ†
,              , Male  ,Female ,Overall,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,Caucasian     , 193.20, 169.71, 183.53,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,Black         , 227.33, 175.00, 214.25,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,Hispanic      , 156.00,      ., 156.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,Asian         , 188.50, 185.50, 187.50,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,Other         , 179.00,      ., 179.00,
‡ƒƒƒƒƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,Overall       , 192.95, 173.40, 186.43,
Šƒƒƒƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒŒ
```

Workshop 3

3. Using TABULATE produce a list with the average, minimum and maximum values of WEIGHT for each RACE. Include an overall row at the bottom, and eliminate all separators.

	WEIGHT		
	Average	Minimum	Maximum
RACE			
Caucasian	183.53	140	220
Black	214.25	175	266
Hispanic	156.00	154	158
Asian	187.50	161	217
Other	179.00	179	179
OVERALL	186.43	140	266

Workshop Solutions

WORKSHOP 1

```
* Exercise 1;
proc freq compress;
 table center dose weight;
run;

* Exercise 2;
proc freq;
 table center*dose;
run;

* Exercise 3;
* data-dependent solution;
proc freq order=data;
 table center*dose;
 format dose $dose.;
run;

* not data-dependent;
proc format;
 value $dose '5 mg'=' 5 mg';
run;

proc freq order=formatted;
 table center*dose;
 format dose $dose.;
run;
```

```
* Exercise 4;
proc freq;
 table center*dose / list;
run;

* Exercise 5;
proc freq formchar(1,2,7)='   ';
 table center*dose /
       norow nocol nopct;
run;

* Exercise 6;
proc freq noprint;
 table center*dose /
       out=ctrds outpct;
run;

proc print data=ctrds;
run;
```

Workshop Solutions

WORKSHOP 2

```
* Exercise 1;
proc tabulate;
 class center dose;
 table center*n=' ';
 table dose*n=' ';
run;

* Exercise 2;
proc tabulate format=6.;
 class dose center;
 table dose='Daily Dose',
       center='Center'*n=' ' / rts=8;
run;

* Exercise 3;
proc tabulate format=6.;
 class sex race dose;
 table sex*race,
       dose='DAILY DOSE'*n=' ' /
       rts=20 misstext='0' printmiss;
 format sex sex. race race.;
run;
```

```
* Exercise 4;
proc tabulate format=6. noseps;
 class sex race dose;
 table sex*race,
       dose='DAILY DOSE'*n=' ' /
       rts=15 misstext='0' printmiss
       indent=3;
 format sex sex. race race.;
run;
```

Workshop Solutions

WORKSHOP 3

```
* Exercise 1;
proc format;
 value $dose '5 mg'=' 5 mg';
run;

proc tabulate order=formatted;
 class dose center;
 table dose='Daily Dose',
       center='Center'*(n='n'*f=4.
pctn<center>='%'*f=5.2) /
       rts=10;
 format dose $dose. center $ctr.;
run;
```

```
* Exercise 2;
proc tabulate format=6.;
 class race sex;
 var weight;
 table race=' ' all,
       (sex=' ' all)*
       weight=' '*mean=' '*f=7.2 /
       rts=15;
 keylabel all='Overall';
 format sex sex. race race.;
run;
```

```
* Exercise 3;
proc tabulate formchar='            '
     format=7.2;
 class race;
 var weight;
 table race all='OVERALL',
       weight*(mean min*f=7. max *f=7.) /
       rts=15;
 keylabel mean='Average'
          min='Minimum'
          max='Maximum';
 format race race.;
run;
```

The End