Updated for V8

Advanced SAS Tabulate Features

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Course Description

This course shows how to include totals and percentages to tables created by PROC TABULATE. It explains the syntax for specifying the denominator for the percentages for various table layouts. The options covered are the following:

- ALL
- N and SUM
- PCTN and PCTSUM
- additional V8 options

Prerequisites

You must know how to:

- specify the layout of the table (i.e. nest variables, concatenate variables and specify dimensions)
- apply formats and labels
- customize the elements of the table
- obtain row and column totals

Documentation

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

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

http://statsoft.nih.gov

SAS 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

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 Review

```
proc tabulate;
 class race sex;
 var weight;
 table race all, (sex all)*weight*mean;
run;
```

- PROC TABULATE invokes the procedure and, optionally, specifies options.
- CLASS lists the classification variables.
- VAR lists the analysis variables.
- TABLE specifies the variables to include in the table and the table layout. You can also request percentages, sums, formats and labels.

Result

```
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```

Customizing the Table

```
proc format;
 value $ctr 'A'='NIH'
            'B'='CDC';
 value sex  1='Male'
            2='Female';
 value race 1='Caucasian'
            2='Black'
            3='Hispanic'
            4='Asian'
            5='Other';
run;
```

```
„ƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒ†
,         ,     Sex     ,      ,
,         ‡ƒƒƒƒƒƒ…ƒƒƒƒƒƒ‰ Row  ,
,         , Male ,Female,Totals,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Race     ,      ,      ,      ,
‡ƒƒƒƒƒƒƒƒƒ‰      ,      ,      ,
,Caucasian,193.20,169.71,183.53,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Black    ,227.33,175.00,214.25,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Hispanic ,156.00,    NA,156.00,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Asian    ,188.50,185.50,187.50,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Other    ,179.00,    NA,179.00,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Column   ,      ,      ,      ,
,Totals   ,192.95,173.40,186.43,
Šƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒŒ
```

```
proc tabulate;
 class race sex;
 var weight;
 table race='Race' all='Column Totals',
       (sex='Sex' all='Row Totals')*weight=' '*mean*f=6.2 /
       rts=11 misstext='NA';
 keylabel mean=' ';
 format race race. sex sex.;
run;
```

Specifying Combinations to Include –V8 CLASSDATA= Option

```
*add center C;
data groups;
 do sex=1,2;
   do race=1 to 5;
     do center='A','B','C';
       output;
     end;end;end;
run;

proc tabulate format=5. classdata=groups;
 class center sex race;
 table sex*race, center / rts=20;
 format sex sex. race race. center $ctr.;
run;
```

Specifying Combinations to Include – V8 CLASSDATA= Option

```
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```

Excluding Combinations – V8 EXCLUSIVE Option

```
data groups2;
 set groups;
 where race in(2,3);
run;

proc tabulate format=5. classdata=groups2 exclusive;
 class center sex race;
 table sex*race all, center / rts=20;
 format sex sex. race race. center $ctr.;
run;
```

```
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```

Specifying Combinations to Include – V8 PRELOADFMT Option

The PRELOADFMT option must be used together with either ORDER=DATA, PRINTMISS or EXCLUSIVE.

```
proc format;
 value $centr 'A'='NIH' 'B'='CDC' 'C'='Hopkins';
run;

proc tabulate format=7.;
 class center / preloadfmt;
 class sex race;
 table sex*race, center / rts=20 printmiss;
 format sex sex. race race. center $centr.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                   ,        CENTER         ,
,                   ‡ƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒ‰
,                   ,  NIH  ,  CDC  ,Hopkins,
,                   ‡ƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,                   ,   N   ,   N   ,   N   ,
‡ƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,SEX     ,RACE     ,       ,       ,       ,
‡ƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒ‰       ,       ,       ,
,Male    ,Caucasian,      3,      7,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Black    ,      3,      .,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Hispanic ,      1,      1,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Asian    ,      2,      2,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Other    ,      .,      1,      .,
‡ƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,Female  ,Caucasian,      3,      4,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Black    ,      1,      .,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Hispanic ,      .,      .,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Asian    ,      .,      2,      .,
,        ‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒ‰
,        ,Other    ,      .,      .,      .,
Šƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒŒ
```

Multilevel Formats – V8
MLF Option

```
proc format;
 value wgt (multilabel)
       low-174='Below 175'
       175-200='Between 175 and 200'
       201-high='Over 200'
       low-250='100-250'
       250-high='251-300';
run;

proc tabulate format=7.;
 class sex;
 class weight / mlf;
 table weight all, sex / rts=21;
 format sex sex. weight wgt.;
run;
```

```
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```

Including Counts and Percentages

```
proc tabulate;
 class race sex;
 table race all, (sex all)*(n pctn)*f=6.2 / rts=11;
 format race race. sex sex.;
run;
```

```
„ffffffffff…ffffffffffffffffffffffffff…fffffffffffff†
,         ,            SEX            ,             ,
,         ‡ffffffffffffff…ffffffffffffff‰            ,
,         ,    Male     ,   Female    ,     ALL     ,
,         ‡ffffff…ffffffˆffffff…ffffffˆffffff…ffffff‰
,         ,  N   , PCTN ,  N   , PCTN ,  N   , PCTN ,
‡ffffffffffˆffffffˆffffffˆffffffˆffffffˆffffffˆffffff‰
,RACE     ,      ,      ,      ,      ,      ,      ,
‡ffffffffff‰      ,      ,      ,      ,      ,      ,
,Caucasian, 10.00, 33.33,  7.00, 23.33, 17.00, 56.67,
‡ffffffffffˆffffffˆffffffˆffffffˆffffffˆffffffˆffffff‰
,Black    ,  3.00, 10.00,  1.00,  3.33,  4.00, 13.33,
‡ffffffffffˆffffffˆffffffˆffffffˆffffffˆffffffˆffffff‰
,Hispanic ,  2.00,  6.67,     .,     .,  2.00,  6.67,
‡ffffffffffˆffffffˆffffffˆffffffˆffffffˆffffffˆffffff‰
,Asian    ,  4.00, 13.33,  2.00,  6.67,  6.00, 20.00,
‡ffffffffffˆffffffˆffffffˆffffffˆffffffˆffffffˆffffff‰
,Other    ,  1.00,  3.33,     .,     .,  1.00,  3.33,
‡ffffffffffˆffffffˆffffffˆffffffˆffffffˆffffffˆffffff‰
,ALL      , 20.00, 66.67, 10.00, 33.33, 30.00,100.00,
Šffffffffff‹ffffff‹ffffff‹ffffff‹ffffff‹ffffff‹ffffffŒ
```

The Denominator Definition

By default, the denominator used to calculate percentages is the overall total.

To specify a different denominator it is easier if you first create the table without the percentages. Then ask yourself,

“Which values do I need to add to get the denominator?”

Your answer will tell you what variables to include in the denominator definition. Sometimes the sum consists of just one variable. However, in more complex cases this sum involves more than one variable.

You specify the denominator expression immediately after PCTN or PCTSUM, and enclose it in angle brackets (i.e. < >).

Calculating Row Percentages

```
proc tabulate;
 class race sex;
 table race, sex*f=6.2 / rts=11;
 format race race. sex sex.;
run;
```

```
„fffffffff…ffffffffffff†
,         ,     SEX     ,
,         ‡ffffff…ffffff‰
,         , Male ,Female,
,         ‡ffffffˆffffff‰
,         ,  N   ,  N   ,
‡fffffffffˆffffffˆffffff‰
,RACE     ,      ,      ,
‡fffffffff‰      ,      ,
,Caucasian, 10.00,  7.00,
‡fffffffffˆffffffˆffffff‰
,Black    ,  3.00,  1.00,
‡fffffffffˆffffffˆffffff‰
,Hispanic ,  2.00,     .,
‡fffffffffˆffffffˆffffff‰
,Asian    ,  4.00,  2.00,
‡fffffffffˆffffffˆffffff‰
,Other    ,  1.00,     .,
Šfffffffff‹ffffff‹ffffffŒ
```

Across which values should we add to calculate row percentages?

Is it the values of RACE?

Or, is it the values of SEX?

Calculating Row Percentages

```
proc tabulate;
 class race sex;
 table race, sex*(n pctn<sex>)*f=6.2 / rts=11;
 format race race. sex sex.;
run;
```

We need to add the values of SEX across each row, and use that as the denominator for the percentages for that race.

Specifying PCTN<SEX> in the TABLE statement gives the row percentages.

Under **version 8** you can replace PCTN<SEX> by the new option ROWPCTN.

```
„ƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,         ,            SEX            ,
,         ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒ‰
,         ,    Male     ,   Female    ,
,         ‡ƒƒƒƒƒƒ…ƒƒƒƒƒƒˆƒƒƒƒƒƒ…ƒƒƒƒƒƒ‰
,         ,  N   , PCTN ,  N   , PCTN ,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,RACE     ,      ,      ,      ,      ,
‡ƒƒƒƒƒƒƒƒƒ‰      ,      ,      ,      ,
,Caucasian, 10.00, 58.82,  7.00, 41.18,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Black    ,  3.00, 75.00,  1.00, 25.00,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Hispanic ,  2.00,100.00,     .,     .,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Asian    ,  4.00, 66.67,  2.00, 33.33,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Other    ,  1.00,100.00,     .,     .,
Šƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒŒ
```

Calculating Column Percentages

```
proc tabulate;
 class race sex;
 table race, sex*(n pctn<race>)*f=6.2 / rts=11;
 format race race. sex sex.;
run;
```

Under **version 8** you can replace PCTN<RACE> by the new option COLPCTN.

```
„ffffffffff…ffffffffffffffffffffffffffff†
,          ,            SEX             ,
,          ‡ffffffffffffff…ffffffffffffff‰
,          ,    Male      ,   Female    ,
,          ‡ffffff…ffffffˆffffff…ffffff‰
,          ,  N   , PCTN ,  N   , PCTN ,
‡ffffffffffˆffffffˆffffffˆffffffˆffffff‰
,RACE      ,      ,      ,      ,      ,
‡ffffffffff‰      ,      ,      ,      ,
,Caucasian, 10.00, 50.00,  7.00, 70.00,
‡ffffffffffˆffffffˆffffffˆffffffˆffffff‰
,Black     ,  3.00, 15.00,  1.00, 10.00,
‡ffffffffffˆffffffˆffffffˆffffffˆffffff‰
,Hispanic ,  2.00, 10.00,     .,     .,
‡ffffffffffˆffffffˆffffffˆffffffˆffffff‰
,Asian     ,  4.00, 20.00,  2.00, 20.00,
‡ffffffffffˆffffffˆffffffˆffffffˆffffff‰
,Other     ,  1.00,  5.00,     .,     .,
Šffffffffff‹ffffff‹ffffff‹ffffff‹ffffffŒ
```

Percentages and the Keyword ALL

```
proc tabulate;
 class race sex;
 table race, (sex all)*(n pctn<sex>)*f=6.2 / rts=10;
run;
```

CAUTION: If you use the keyword ALL to display totals, you must include ALL in the denominator definition. The program shown above is incorrect and would generate the following error message:

```
ERROR: PCTN base is not in table.
ERROR: A PCTN crossing has no denominator.
```

Percentages and the Keyword ALL

```
proc tabulate;
 class race sex;
 table race,
       (sex all)*(n pctn<sex all>)*f=6.2 / rts=11;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,         ,            SEX            ,             ,
,         ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒƒƒƒƒ‰             ,
,         ,    Male     ,   Female    ,     ALL     ,
,         ‡ƒƒƒƒƒƒ…ƒƒƒƒƒƒˆƒƒƒƒƒƒ…ƒƒƒƒƒƒˆƒƒƒƒƒƒ…ƒƒƒƒƒƒ‰
,         ,  N   , PCTN ,  N   , PCTN ,  N   , PCTN ,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,RACE     ,      ,      ,      ,      ,      ,      ,
‡ƒƒƒƒƒƒƒƒƒ‰      ,      ,      ,      ,      ,      ,
,Caucasian, 10.00, 58.82,  7.00, 41.18, 17.00,100.00,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Black    ,  3.00, 75.00,  1.00, 25.00,  4.00,100.00,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Hispanic ,  2.00,100.00,     .,     .,  2.00,100.00,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Asian    ,  4.00, 66.67,  2.00, 33.33,  6.00,100.00,
‡ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒˆƒƒƒƒƒƒ‰
,Other    ,  1.00,100.00,     .,     .,  1.00,100.00,
Šƒƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒƒƒƒŒ
```

Percentages and the Keyword ALL Version 8

The issue mentioned on the previous page is not an issue under version 8 since you can use the new option ROWPCTN.

```
proc tabulate;
 class race sex;
 table race,
       (sex all)*(n rowpctn)*f=6.2 / rts=11;
 format race race. sex sex.;
run;
```

Simple Example of SUM and PCTSUM

```
proc tabulate;
 class race sex;
 var weight;
 table race all,
       (sex all)*weight*(sum pctsum)*f=7.2 / rts=11;
 format race race. sex sex.;
run;
```

```
„ffffffff…ffffffffffffffffffffffffffffff…ffffffffffffff†
,         ,              SEX              ,              ,
,         ‡ffffffffffffff…ffffffffffffff‰               ,
,         ,     Male      ,    Female     ,      ALL     ,
,         ‡ffffffffffffffˆffffffffffffffˆffffffffffffff‰
,         ,    WEIGHT     ,    WEIGHT     ,    WEIGHT    ,
,         ‡fffffff…fffffffˆfffffff…fffffffˆfffffff…fffffff‰
,         ,  SUM  ,PCTSUM ,  SUM  ,PCTSUM ,  SUM  ,PCTSUM ,
‡ffffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffff‰
,RACE     ,       ,       ,       ,       ,       ,       ,
‡ffffffff‰        ,       ,       ,       ,       ,       ,
,Caucasian,1932.00,  34.54,1188.00,  21.24,3120.00,  55.78,
‡ffffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffff‰
,Black    , 682.00,  12.19, 175.00,   3.13, 857.00,  15.32,
‡ffffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffff‰
,Hispanic , 312.00,   5.58,      .,      ., 312.00,   5.58,
‡ffffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffff‰
,Asian    , 754.00,  13.48, 371.00,   6.63,1125.00,  20.11,
‡ffffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffff‰
,Other    , 179.00,   3.20,      .,      ., 179.00,   3.20,
‡ffffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffffˆfffffff‰
,ALL      ,3859.00,  69.00,1734.00,  31.00,5593.00, 100.00,
Šffffffff‹fffffff‹fffffff‹fffffff‹fffffff‹fffffff‹fffffffŒ
```

Row Percentages with SUM and PCTSUM

```
proc tabulate;
 class race sex;
 var weight;
 table race all,
       (sex all)*weight*(sum pctsum<sex all>)*f=7.2 / rts=11;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒ
```

Row Percentages with SUM and PCTSUM Version 8

The issue mentioned on the previous page is not an issue under version 8 since you can use the new option ROWPCTSUM.

```
proc tabulate;
 class race sex;
 var weight;
 table race all,
       (sex all)*weight*(sum rowpctsum)*f=7.2 / rts=11;
 format race race. sex sex.;
run;
```

Nesting Variables
Overall Percentages

```
proc tabulate;
 class race sex dose;
 table sex*race all,
       (dose all)*(n pctn)*f=6.2 / rts=20;
 format race race. sex sex.;
run;
```

```
„ƒƒƒ
```

Nesting Variables
Row Percentages

```
proc tabulate;
 class race sex dose;
 table sex*race all,
       (dose all)*(n pctn<dose all>)*f=6.2 / rts=20;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                 ,                 DOSE                  ,            ,
,                 ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
```

Nesting Variables
Row Percentages
Version 8

```
proc tabulate;
 class race sex dose;
 table sex*race all,
       (dose all)*(n rowpctn)*f=6.2 / rts=20;
 format race race. sex sex.;
run;
```

Nesting Variables
Column Percentages

```
proc tabulate;
 class race sex dose;
 table sex*race all,
       (dose all)*(n pctn<sex*race all>)*f=6.2 / rts=20;
 format race race. sex sex.;
run;
```

```
„ƒƒƒ
```

Nesting Variables
Column Percentages
Version 8

```
proc tabulate;
 class race sex dose;
 table sex*race all,
       (dose all)*(n colpctn)*f=6.2 / rts=20;
 format race race. sex sex.;
run;
```

Nesting Variables
Column Percentages by Sex

```
proc tabulate;
 class race sex dose;
 table sex*(race all),
       (dose all)*(n pctn<race all>)*f=6.2 / rts=20;
 format race race. sex sex.;
run;
```

```
„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ†
,                 ,                        DOSE                        ,             ,
,                 ‡ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
```

Order of PCTN Expressions

The order in which you specify the expressions in the denominator definition is important. TABULATE uses the first valid denominator definition expression for each expression of the TABLE statement. A valid denominator definition is an expression that contains a subset of the table expression.

```
proc tabulate;
 class race sex;
 table race all,
       (sex all)*(n*f=4.
        pctn<race all>='Col %'*f=6.2)/rts=8;
run;
```

table expressions	denominator expression used
race*sex	race
race*all	race
all*sex	all
all*all	all

```
„ffffff…ffffffffffffffffffffff…fffffffffff†
,      ,           SEX           ,           ,
,      ‡fffffffffff…fffffffffff‰            ,
,      ,     1     ,     2     ,    ALL    ,
,      ‡ffff…ffffff^ffff…ffffff^ffff…ffffff‰
,      , N  ,Col % , N  ,Col % , N  ,Col % ,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,RACE  ,    ,      ,    ,      ,    ,      ,
‡ffffff‰    ,      ,    ,      ,    ,      ,
,1     ,  10, 50.00,   7, 70.00,  17, 56.67,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,2     ,   3, 15.00,   1, 10.00,   4, 13.33,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,3     ,   2, 10.00,   .,     .,   2,  6.67,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,4     ,   4, 20.00,   2, 20.00,   6, 20.00,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,5     ,   1,  5.00,   .,     .,   1,  3.33,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,ALL   ,  20,100.00,  10,100.00,  30,100.00,
Šffffff‹ffff‹ffffff‹ffff‹ffffff‹ffff‹ffffffŒ
```

Order of PCTN Expressions (continued)

Here we changed “RACE ALL” to “ALL RACE” in the table expression AND the PCTN expression. The last column is now incorrect! Check the denominator used below to see why.

```
proc tabulate;
 class race sex;
 table all race,
       (sex all)*(n*f=4.
        pctn<all race>='Col %'*f=6.2)/rts=8;
run;
```

table expressions	denominator expression used
race*sex	race
race*all	**all**
all*sex	all
all*all	all

```
„ffffff…ffffffffffffffffffffff…fffffffffff†
,      ,          SEX          ,           ,
,      ‡fffffffffff…fffffffffff‰           ,
,      ,     1     ,     2     ,    ALL    ,
,      ‡ffff…ffffff^ffff…ffffff^ffff…ffffff‰
,      , N  ,Col % , N  ,Col % , N  ,Col % ,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,ALL   ,  20,100.00,  10,100.00,  30,100.00,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,RACE  ,    ,      ,    ,      ,    ,      ,
‡ffffff‰    ,      ,    ,      ,    ,      ,
,1     ,  10, 50.00,   7, 70.00,  17,100.00,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,2     ,   3, 15.00,   1, 10.00,   4,100.00,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,3     ,   2, 10.00,   .,     .,   2,100.00,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,4     ,   4, 20.00,   2, 20.00,   6,100.00,
‡ffffff^ffff^ffffff^ffff^ffffff^ffff^ffffff‰
,5     ,   1,  5.00,   .,     .,   1,100.00,
Šffffff‹ffff‹ffffff‹ffff‹ffffff‹ffff‹ffffffŒ
```

Order of PCTN Expressions (continued)

This is the correct PCTN specification:

```
proc tabulate;
 class race sex;
 table all race,
       (sex all)*(n*f=4.
        pctn<race all>='Col %'*f=6.2)/rts=8;
run;
```

```
„ffffff…ffffffffffffffffffffff…fffffffffff†
,      ,          SEX          ,           ,
,      ‡fffffffffff…fffffffffff‰           ,
,      ,     1     ,     2     ,    ALL    ,
,      ‡ffff…ffffffˆffff…ffffffˆffff…ffffff‰
,      , N  ,Col % , N  ,Col % , N  ,Col % ,
‡ffffffˆffffˆffffffˆffffˆffffffˆffffˆffffff‰
,ALL   ,  20,100.00,  10,100.00,  30,100.00,
‡ffffffˆffffˆffffffˆffffˆffffffˆffffˆffffff‰
,RACE  ,    ,      ,    ,      ,    ,      ,
‡ffffff‰    ,      ,    ,      ,    ,      ,
,1     ,  10, 50.00,   7, 70.00,  17, 56.67,
‡ffffffˆffffˆffffffˆffffˆffffffˆffffˆffffff‰
,2     ,   3, 15.00,   1, 10.00,   4, 13.33,
‡ffffffˆffffˆffffffˆffffˆffffffˆffffˆffffff‰
,3     ,   2, 10.00,   .,     .,   2,  6.67,
‡ffffffˆffffˆffffffˆffffˆffffffˆffffˆffffff‰
,4     ,   4, 20.00,   2, 20.00,   6, 20.00,
‡ffffffˆffffˆffffffˆffffˆffffffˆffffˆffffff‰
,5     ,   1,  5.00,   .,     .,   1,  3.33,
Šffffff‹ffff‹ffffff‹ffff‹ffffff‹ffff‹ffffffŒ
```

table expressions	denominator expression used
race*sex	race
race*all	**race**
all*sex	all
all*all	all

Order of PCTN Expressions (continued)

Under V8 this is not a problem since you can use the COLPCTN option.

```
proc tabulate;
 class race sex;
 table all race,
       (sex all)*(n*f=4. colpctn='Col %'*f=6.2) / rts=8;
run;
```

Workshop 1

In the following exercises you are asked to create the tables shown. You don't need to make them look exactly like these. It is more important that the values are correct and the variables and values appear in the order shown.

Simple and complex solutions to these exercises are included at the end of these notes. To create the tables displayed here the complex solutions were used . They are equivalent to the simple solutions but customization options were included.

Before you start, open and submit the program called

`C:\SASTAB\SETUP.SAS`

Workshop 1

1. Create three tables that display CENTER on the column dimension and RACE on the row dimension.

   Include a TOTAL row at the bottom of the table. Display frequency counts and the percentages specified below.

   a. overall percentages

   b. column percentages

   c. row percentages

Table 1a

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ†
,          ,   NIH    ,   CDC    ,
,          ‡ƒƒƒ…ƒƒƒƒƒƒˆƒƒƒ…ƒƒƒƒƒƒ‰
,          , n ,  %   , n ,  %   ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒƒ‰
,Caucasian ,  6, 20.00, 11, 36.67,
,Black     ,  4, 13.33,  .,     .,
,Hispanic  ,  1,  3.33,  1,  3.33,
,Asian     ,  2,  6.67,  4, 13.33,
,Other     ,  .,     .,  1,  3.33,
,Total     , 13, 43.33, 17, 56.67,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒƒŒ
```

Table 1b

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ†
,          ,   NIH    ,   CDC    ,
,          ‡ƒƒƒ…ƒƒƒƒƒƒˆƒƒƒ…ƒƒƒƒƒƒ‰
,          , n ,  %   , n ,  %   ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒƒ‰
,Caucasian ,  6, 46.15, 11, 64.71,
,Black     ,  4, 30.77,  .,     .,
,Hispanic  ,  1,  7.69,  1,  5.88,
,Asian     ,  2, 15.38,  4, 23.53,
,Other     ,  .,     .,  1,  5.88,
,Total     , 13,100.00, 17,100.00,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒƒŒ
```

Table 1c

```
„ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ†
,          ,   NIH    ,   CDC    ,
,          ‡ƒƒƒ…ƒƒƒƒƒƒˆƒƒƒ…ƒƒƒƒƒƒ‰
,          , n ,  %   , n ,  %   ,
‡ƒƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒƒ‰
,Caucasian ,  6, 35.29, 11, 64.71,
,Black     ,  4,100.00,  .,     .,
,Hispanic  ,  1, 50.00,  1, 50.00,
,Asian     ,  2, 33.33,  4, 66.67,
,Other     ,  .,     .,  1,100.00,
,Total     , 13, 43.33, 17, 56.67,
Šƒƒƒƒƒƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒƒŒ
```

Workshop 1

2. Create three tables that display CENTER on the column dimension and SEX nested within RACE on the row dimension. Display all combinations of SEX and RACE.

   Include a TOTAL row and a TOTAL column. Display frequency counts and the percentages specified below.

   a. overall percentages

   b. column percentages

   c. row percentages

Table 2a

	NIH		CDC		TOTAL	
	n	%	n	%	n	%
Caucasian						
Male	3	10.00	7	23.33	10	33.33
Female	3	10.00	4	13.33	7	23.33
Black						
Male	3	10.00	0	0	3	10.00
Female	1	3.33	0	0	1	3.33
Hispanic						
Male	1	3.33	1	3.33	2	6.67
Female	0	0	0	0	0	0
Asian						
Male	2	6.67	2	6.67	4	13.33
Female	0	0	2	6.67	2	6.67
Other						
Male	0	0	1	3.33	1	3.33
Female	0	0	0	0	0	0
TOTAL	13	43.33	17	56.67	30	100.00

Workshop 1

Table 2b

	NIH		CDC		TOTAL	
	n	%	n	%	n	%
Caucasian						
Male	3	23.08	7	41.18	10	33.33
Female	3	23.08	4	23.53	7	23.33
Black						
Male	3	23.08	0	0	3	10.00
Female	1	7.69	0	0	1	3.33
Hispanic						
Male	1	7.69	1	5.88	2	6.67
Female	0	0	0	0	0	0
Asian						
Male	2	15.38	2	11.76	4	13.33
Female	0	0	2	11.76	2	6.67
Other						
Male	0	0	1	5.88	1	3.33
Female	0	0	0	0	0	0
TOTAL	13	100.00	17	100.00	30	100.00

Table 2c

	NIH		CDC		TOTAL	
	n	%	n	%	n	%
Caucasian						
Male	3	30.00	7	70.00	10	100.00
Female	3	42.86	4	57.14	7	100.00
Black						
Male	3	100.00	0	0	3	100.00
Female	1	100.00	0	0	1	100.00
Hispanic						
Male	1	50.00	1	50.00	2	100.00
Female	0	0	0	0	0	0
Asian						
Male	2	50.00	2	50.00	4	100.00
Female	0	0	2	100.00	2	100.00
Other						
Male	0	0	1	100.00	1	100.00
Female	0	0	0	0	0	0
TOTAL	13	43.33	17	56.67	30	100.00

Workshop 1

3. Create a table that displays CENTER on the column dimension and SEX nested within RACE on the row dimension.

   Include a TOTAL column and TOTAL rows for each RACE.

   Display frequency counts and column percentages for each sex within each race and center.

Workshop 1

„ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒƒ†
, NIH , CDC , Total ,
, ‡ƒƒƒ…ƒƒƒƒƒˆƒƒƒ…ƒƒƒƒƒˆƒƒƒ…ƒƒƒƒƒ‰
, n , % , n , % , n , % ,
‡ƒƒƒƒƒƒƒƒƒ…ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
,Caucasian,Male , 3, 50.00, 7, 63.64, 10, 58.82,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Female , 3, 50.00, 4, 36.36, 7, 41.18,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Total , 6,100.00, 11,100.00, 17,100.00,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
,Black ,Male , 3, 75.00, 0, 0, 3, 75.00,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Female , 1, 25.00, 0, 0, 1, 25.00,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Total , 4,100.00, 0, 0, 4,100.00,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
,Hispanic ,Male , 1,100.00, 1,100.00, 2,100.00,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Female , 0, 0, 0, 0, 0, 0,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Total , 1,100.00, 1,100.00, 2,100.00,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
,Asian ,Male , 2,100.00, 2, 50.00, 4, 66.67,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Female , 0, 0, 2, 50.00, 2, 33.33,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Total , 2,100.00, 4,100.00, 6,100.00,
‡ƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
,Other ,Male , 0, 0, 1,100.00, 1,100.00,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Female , 0, 0, 0, 0, 0, 0,
, ‡ƒƒƒƒƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒˆƒƒƒˆƒƒƒƒƒ‰
, ,Total , 0, 0, 1,100.00, 1,100.00,
Šƒƒƒƒƒƒƒƒ‹ƒƒƒƒƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒ‹ƒƒƒ‹ƒƒƒƒƒŒ

Workshop 1

4. Modify your solution to exercise 3 so the TOTAL rows appear before the “Male” and “Female” rows.

```
„ƒƒƒ
```

Nested Variables on Both Dimensions
Counts

```
proc tabulate format=5.;
 class race sex dose center;
 table sex*(race all),
       center*(dose all) / rts=20 misstext='0';
 format race race. sex sex. center $ctr.;
run;
```

Results

		CENTER							
		NIH				CDC			
		DOSE				DOSE			
		10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL
SEX	RACE	N	N	N	N	N	N	N	N
Male	Caucasian	1	1	1	3	2	3	2	7
	Black	1	0	2	3	0	0	0	0
	Hispanic	0	0	1	1	0	1	0	1
	Asian	1	1	0	2	0	1	1	2
	Other	0	0	0	0	0	1	0	1
	ALL	3	2	4	9	2	6	3	11
Female	RACE								
	Caucasian	1	2	0	3	2	0	2	4
	Black	1	0	0	1	0	0	0	0
	Asian	0	0	0	0	2	0	0	2
	ALL	2	2	0	4	4	0	2	6

Nested Variables on Both Dimensions

Row Percentages

TABULATE does not allow the use of parenthesis within the PCTN expression:

invalid pctn<center*(dose all)>

valid pctn<center*dose center>

```
proc tabulate format=6.2;
 class race sex dose center;
 table sex*(race all),
       center*(dose all)*pctn<center*dose center> /
       rts=20 misstext='0.00';
 format race race. sex sex. center $ctr.;
run;
```

Result

```
„ƒƒƒ
```

Nested Variables on Both Dimensions
Counts

```
proc tabulate format=5.;
 class race sex dose center;
 table (sex all)*(race all),
       (center all)*(dose all) / rts=20 misstext='0';
 format race race. sex sex. center $ctr.;
run;
```

Result

	CENTER											
	NIH			CDC			ALL					
	DOSE			DOSE			DOSE					
	10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL
	N	N	N	N	N	N	N	N	N	N	N	N
SEX	RACE											
Male	Caucasian	1	1	1	3	2	3	2	7	3	4	3	10
	Black	1	0	2	3	0	0	0	0	1	0	2	3
	Hispanic	0	0	1	1	0	1	0	1	0	1	1	2
	Asian	1	1	0	2	0	1	1	2	1	2	1	4
	Other	0	0	0	0	0	1	0	1	0	1	0	1
	ALL	3	2	4	9	2	6	3	11	5	8	7	20
Female	RACE												
	Caucasian	1	2	0	3	2	0	2	4	3	2	2	7
	Black	1	0	0	1	0	0	0	0	1	0	0	1
	Asian	0	0	0	0	2	0	0	2	2	0	0	2
	ALL	2	2	0	4	4	0	2	6	6	2	2	10
ALL	RACE												
	Caucasian	2	3	1	6	4	3	4	11	6	6	5	17
	Black	2	0	2	4	0	0	0	0	2	0	2	4
	Hispanic	0	0	1	1	0	1	0	1	0	1	1	2
	Asian	1	1	0	2	2	1	1	4	3	2	1	6
	Other	0	0	0	0	0	1	0	1	0	1	0	1
	ALL	5	4	4	13	6	6	5	17	11	10	9	30

Nested Variables on Both Dimensions
Overall Percentages

```
proc tabulate format=7.2;
 class race sex dose center;
 table (sex all)*(race all),
       (center all)*(dose all)*pctn / rts=20;
 format race race. sex sex. center $ctr.;
run;
```

Result

		CENTER		
		NIH	CDC	ALL
		DOSE	DOSE	DOSE
		10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL
		PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN
SEX	RACE												
Male	Caucasian	3.33	3.33	3.33	10.00	6.67	10.00	6.67	23.33	10.00	13.33	10.00	33.33
	Black	3.33	.	6.67	10.00	.	.	.	.	3.33	.	6.67	10.00
	Hispanic	.	.	3.33	3.33	.	3.33	.	3.33	.	3.33	3.33	6.67
	Asian	3.33	3.33	.	6.67	.	3.33	3.33	6.67	3.33	6.67	3.33	13.33
	Other	.	.	.	.	.	3.33	.	3.33	.	3.33	.	3.33
	ALL	10.00	6.67	13.33	30.00	6.67	20.00	10.00	36.67	16.67	26.67	23.33	66.67
Female	RACE												
	Caucasian	3.33	6.67	.	10.00	6.67	.	6.67	13.33	10.00	6.67	6.67	23.33
	Black	3.33	.	.	3.33	.	.	.	.	3.33	.	.	3.33
	Asian	.	.	.	.	6.67	.	.	6.67	6.67	.	.	6.67
	ALL	6.67	6.67	.	13.33	13.33	.	6.67	20.00	20.00	6.67	6.67	33.33
ALL	RACE												
	Caucasian	6.67	10.00	3.33	20.00	13.33	10.00	13.33	36.67	20.00	20.00	16.67	56.67
	Black	6.67	.	6.67	13.33	.	.	.	.	6.67	.	6.67	13.33
	Hispanic	.	.	3.33	3.33	.	3.33	.	3.33	.	3.33	3.33	6.67
	Asian	3.33	3.33	.	6.67	6.67	3.33	3.33	13.33	10.00	6.67	3.33	20.00
	Other	.	.	.	.	.	3.33	.	3.33	.	3.33	.	3.33
	ALL	16.67	13.33	13.33	43.33	20.00	20.00	16.67	56.67	36.67	33.33	30.00	100.00

Nested Variables on Both Dimensions
Overall Percentages Within Each Subtable

```
proc tabulate format=7.2;
 class race sex dose center;
 table (sex all)*(race all),
       (center all)*(dose all)*
       pctn<race*dose race dose all> / rts=20;
 format race race. sex sex. center $ctr.;
run;
```

Result

		CENTER										
		NIH			CDC				ALL			
		DOSE			DOSE				DOSE			
		10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL
		PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN
SEX	RACE												
Male	Caucasian	11.11	11.11	11.11	33.33	18.18	27.27	18.18	63.64	15.00	20.00	15.00	50.00
	Black	11.11	.	22.22	33.33	.	.	.	.	5.00	.	10.00	15.00
	Hispanic	.	.	11.11	11.11	.	9.09	.	9.09	.	5.00	5.00	10.00
	Asian	11.11	11.11	.	22.22	.	9.09	9.09	18.18	5.00	10.00	5.00	20.00
	Other	.	.	.	.	.	9.09	.	9.09	.	5.00	.	5.00
	ALL	33.33	22.22	44.44	100.00	18.18	54.55	27.27	100.00	25.00	40.00	35.00	100.00
Female	RACE												
	Caucasian	25.00	50.00	.	75.00	33.33	.	33.33	66.67	30.00	20.00	20.00	70.00
	Black	25.00	.	.	25.00	.	.	.	.	10.00	.	.	10.00
	Asian	.	.	.	.	33.33	.	.	33.33	20.00	.	.	20.00
	ALL	50.00	50.00	.	100.00	66.67	.	33.33	100.00	60.00	20.00	20.00	100.00
ALL	RACE												
	Caucasian	15.38	23.08	7.69	46.15	23.53	17.65	23.53	64.71	20.00	20.00	16.67	56.67
	Black	15.38	.	15.38	30.77	.	.	.	.	6.67	.	6.67	13.33
	Hispanic	.	.	7.69	7.69	.	5.88	.	5.88	.	3.33	3.33	6.67
	Asian	7.69	7.69	.	15.38	11.76	5.88	5.88	23.53	10.00	6.67	3.33	20.00
	Other	.	.	.	.	.	5.88	.	5.88	.	3.33	.	3.33
	ALL	38.46	30.77	30.77	100.00	35.29	35.29	29.41	100.00	36.67	33.33	30.00	100.00

Nested Variables on Both Dimensions
Row Percentages Within Each Subtable

```
proc tabulate format=7.2;
 class race sex dose center;
 table (sex all)*(race all),
       (center all)*(dose all)*pctn<dose all> / rts=20;
 format race race. sex sex. center $ctr.;
run;
```

Result

		CENTER											
		NIH				CDC				ALL			
		DOSE				DOSE				DOSE			
		10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL
		PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN
SEX	RACE												
Male	Caucasian	33.33	33.33	33.33	100.00	28.57	42.86	28.57	100.00	30.00	40.00	30.00	100.00
	Black	33.33	.	66.67	100.00	.	.	.	.	33.33	.	66.67	100.00
	Hispanic	.	.	100.00	100.00	.	100.00	.	100.00	.	50.00	50.00	100.00
	Asian	50.00	50.00	.	100.00	.	50.00	50.00	100.00	25.00	50.00	25.00	100.00
	Other	.	.	.	.	.	100.00	.	100.00	.	100.00	.	100.00
	ALL	33.33	22.22	44.44	100.00	18.18	54.55	27.27	100.00	25.00	40.00	35.00	100.00
Female	RACE												
	Caucasian	33.33	66.67	.	100.00	50.00	.	50.00	100.00	42.86	28.57	28.57	100.00
	Black	100.00	.	.	100.00	.	.	.	.	100.00	.	.	100.00
	Asian	.	.	.	.	100.00	.	.	100.00	100.00	.	.	100.00
	ALL	50.00	50.00	.	100.00	66.67	.	33.33	100.00	60.00	20.00	20.00	100.00
ALL	RACE												
	Caucasian	33.33	50.00	16.67	100.00	36.36	27.27	36.36	100.00	35.29	35.29	29.41	100.00
	Black	50.00	.	50.00	100.00	.	.	.	.	50.00	.	50.00	100.00
	Hispanic	.	.	100.00	100.00	.	100.00	.	100.00	.	50.00	50.00	100.00
	Asian	50.00	50.00	.	100.00	50.00	25.00	25.00	100.00	50.00	33.33	16.67	100.00
	Other	.	.	.	.	.	100.00	.	100.00	.	100.00	.	100.00
	ALL	38.46	30.77	30.77	100.00	35.29	35.29	29.41	100.00	36.67	33.33	30.00	100.00

Nested Variables on Both Dimensions
Column Percentages Within Each Subtable

```
proc tabulate format=7.2;
 class race sex dose center;
 table (sex all)*(race all),
       (center all)*(dose all)*pctn<race all> / rts=20;
 format race race. sex sex. center $ctr.;
run;
```

Result

	CENTER											
	NIH			CDC			ALL					
	DOSE			DOSE			DOSE					
	10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL	10 mg	15 mg	5 mg	ALL
	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN	PCTN
SEX	RACE											
Male	Caucasian	33.33	50.00	25.00	33.33	100.00	50.00	66.67	63.64	60.00	50.00	42.86	50.00
	Black	33.33	.	50.00	33.33	.	.	.	.	20.00	.	28.57	15.00
	Hispanic	.	.	25.00	11.11	.	16.67	.	9.09	.	12.50	14.29	10.00
	Asian	33.33	50.00	.	22.22	.	16.67	33.33	18.18	20.00	25.00	14.29	20.00
	Other	.	.	.	.	.	16.67	.	9.09	.	12.50	.	5.00
	ALL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Female	RACE											
	Caucasian	50.00	100.00	.	75.00	50.00	.	100.00	66.67	50.00	100.00	100.00	70.00
	Black	50.00	.	.	25.00	.	.	.	.	16.67	.	.	10.00
	Asian	.	.	.	.	50.00	.	.	33.33	33.33	.	.	20.00
	ALL	100.00	100.00	.	100.00	100.00	.	100.00	100.00	100.00	100.00	100.00	100.00
ALL	RACE											
	Caucasian	40.00	75.00	25.00	46.15	66.67	50.00	80.00	64.71	54.55	60.00	55.56	56.67
	Black	40.00	.	50.00	30.77	.	.	.	.	18.18	.	22.22	13.33
	Hispanic	.	.	25.00	7.69	.	16.67	.	5.88	.	10.00	11.11	6.67
	Asian	20.00	25.00	.	15.38	33.33	16.67	20.00	23.53	27.27	20.00	11.11	20.00
	Other	.	.	.	.	.	16.67	.	5.88	.	10.00	.	3.33
	ALL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Workshop 2

1. Create a table that displays SEX on the column dimension and CENTER and DOSE stacked in the row dimension.

   Include a TOTAL row.

   Display frequency counts and column percentages.

	Female		Male	
	N	Percent	N	Percent
Center				
CDC	6	60.00	11	55.00
NIH	4	40.00	9	45.00
Daily Dose				
5 mg	2	20.00	7	35.00
10 mg	6	60.00	5	25.00
15 mg	2	20.00	8	40.00
Total Patients	10	100.00	20	100.00

Workshop 2

2. Create three tables that display SEX nested within DOSE on the column dimension and RACE nested within CENTER in the row dimension.

   Include a TOTAL column for each DOSE and a TOTAL row for each CENTER.

   a. display only the frequency counts

   b. display only the row percentages

   c. display only the column percentages

Workshop 2

Table 2a

		Daily Dose								
		5 mg			10 mg			15 mg		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
NIH	Caucasian	1	0	1	1	1	2	1	2	3
	Black	2	0	2	1	1	2	0	0	0
	Hispanic	1	0	1	0	0	0	0	0	0
	Asian	0	0	0	1	0	1	1	0	1
	Other	0	0	0	0	0	0	0	0	0
	Total	4	0	4	3	2	5	2	2	4
CDC	Caucasian	2	2	4	2	2	4	3	0	3
	Black	0	0	0	0	0	0	0	0	0
	Hispanic	0	0	0	0	0	0	1	0	1
	Asian	1	0	1	0	2	2	1	0	1
	Other	0	0	0	0	0	0	1	0	1
	Total	3	2	5	2	4	6	6	0	6

Workshop 2

Table 2b

		Daily Dose								
		5 mg			10 mg			15 mg		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
NIH	Caucasian	16.67	0.00	16.67	16.67	16.67	33.33	16.67	33.33	50.00
	Black	50.00	0.00	50.00	25.00	25.00	50.00	0.00	0.00	0.00
	Hispanic	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
	Asian	0.00	0.00	0.00	50.00	0.00	50.00	50.00	0.00	50.00
	Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	30.77	0.00	30.77	23.08	15.38	38.46	15.38	15.38	30.77
CDC	Caucasian	18.18	18.18	36.36	18.18	18.18	36.36	27.27	0.00	27.27
	Black	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Hispanic	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
	Asian	25.00	0.00	25.00	0.00	50.00	50.00	25.00	0.00	25.00
	Other	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
	Total	17.65	11.76	29.41	11.76	23.53	35.29	35.29	0.00	35.29

Workshop 2

Table 2c

		Daily Dose								
		5 mg			10 mg			15 mg		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
NIH	Caucasian	14.29	0.00	11.11	20.00	16.67	18.18	12.50	100.00	30.00
	Black	28.57	0.00	22.22	20.00	16.67	18.18	0.00	0.00	0.00
	Hispanic	14.29	0.00	11.11	0.00	0.00	0.00	0.00	0.00	0.00
	Asian	0.00	0.00	0.00	20.00	0.00	9.09	12.50	0.00	10.00
	Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	57.14	0.00	44.44	60.00	33.33	45.45	25.00	100.00	40.00
CDC	Caucasian	28.57	100.00	44.44	40.00	33.33	36.36	37.50	0.00	30.00
	Black	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Hispanic	0.00	0.00	0.00	0.00	0.00	0.00	12.50	0.00	10.00
	Asian	14.29	0.00	11.11	0.00	33.33	18.18	12.50	0.00	10.00
	Other	0.00	0.00	0.00	0.00	0.00	0.00	12.50	0.00	10.00
	Total	42.86	100.00	55.56	40.00	66.67	54.55	75.00	0.00	60.00

Workshop Solutions

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

/*-------------------------------------------
|  SIMPLE SOLUTIONS WITH NO CUSTOMIZATIONS    |
 --------------------------------------------*/
*** WORKSHOP 1 ***;
* Exercise 1a;
proc tabulate;
 class race center;
 table race all, center*(n pctn);
 format race race. center $ctr.;
run;

* Exercise 1b;
proc tabulate;
 class race center;
 table race all, center*(n pctn<race all>);
 format race race. center $ctr.;
run;
```

```
* Exercise 1c;
proc tabulate;
 class race center;
 table race all, center*(n pctn<center>);
 format race race. center $ctr.;
run;

* Exercise 2a;
proc tabulate;
 class race sex center;
 table race*sex all, (center all)*(n pctn) /
       printmiss;
 format race race. sex sex. center $ctr.;
run;

* Exercise 2b;
proc tabulate;
 class race sex center;
 table race*sex all, (center all)*
       (n pctn<race*sex all>) / printmiss;
 format race race. sex sex. center $ctr.;
run;

* Exercise 2c;
proc tabulate;
 class race sex center;
 table race*sex all, (center all)*(n
    pctn<center all>) / printmiss;
 format race race. sex sex. center $ctr.;
run;
```

Workshop Solutions

```
* Exercise 3;
proc tabulate;
 class race sex center;
 table race*(sex all), (center all)*
      (n pctn<sex all>) / printmiss;
 format race race. sex sex. center $ctr.;
run;

* Exercise 4;
proc tabulate;
 class race sex center;
 table race*(all sex), (center all)*
       (n pctn<sex all>) / printmiss;
 format race race. sex sex. center $ctr.;
run;


*** WORKSHOP 2 ***;
data patients;
 set in.patients;
 if dose='5 mg' then ds=' 5 mg';
 else ds=dose;
run;
```

```
* Exercise 1;
proc tabulate;
 class sex center dose;
 table center dose all, sex*
       (n pctn<center dose all>);
 format sex sex. center $ctr.;
run;

* Exercise 2a, 2b, 2c;
* Exercise 2a;
proc tabulate;
 class center race ds sex;
 table center*(race all),
       ds*(sex all)*n / printmiss misstext='0';
 format center $ctr. race race. sex sex.;
run;

* Exercise 2b;
proc tabulate;
 class center race ds sex;
 table center*(race all),
       ds*(sex all)*pctn<ds*sex ds> /
       printmiss misstext='0.00';
 format center $ctr. race race. sex sex.;
run;
```

Workshop Solutions

```
* Exercise 2c;
proc tabulate;
 class center race ds sex;
 table center*(race all),
       ds*(sex all)*
       pctn<center*race center> /
       printmiss misstext='0.00';
 format center $ctr. race race. sex sex.;
run;
```

```
/*-----------------------------------------
|    SOLUTIONS WITH CUSTOMIZATION OF TABLE   |
 -----------------------------------------*/
*** WORKSHOP 1 ***;
* Exercise 1a;
proc tabulate noseps;
 class race center;
 table race=' ' all='Total',
       center=' '*(n*f=3. pctn*f=6.2) / rts=12;
 keylabel n='n' pctn='%';
 format race race. center $ctr.;
run;

* Exercise 1b;
proc tabulate noseps;
 class race center;
 table race=' ' all='Total',
       center=' '*(n*f=3. pctn<race all>*f=6.2)
       / rts=12;
 keylabel n='n' pctn='%';
 format race race. center $ctr.;
run;
```

Workshop Solutions

```
* Exercise 1c;
proc tabulate noseps;
 class race center;
 table race=' ' all='Total',
       center=' '*(n*f=3. pctn<center>*f=6.2) /
       rts=12;
 keylabel n='n' pctn='%';
 format race race. center $ctr.;
run;

* Exercise 2a;
proc tabulate noseps;
 class race sex center;
 table race*sex all,
       (center=' ' all)*(n*f=3. pctn*f=6.2) /
       printmiss rts=12 misstext='0' indent=3;
 format race race. sex sex. center $ctr.;
 keylabel n='n' pctn='%' all='TOTAL';
run;

* Exercise 2b;
proc tabulate noseps;
 class race sex center;
 table race*sex all,(center=' ' all)*
       (n*f=3. pctn<race*sex all>*f=6.2) /
       printmiss rts=12 misstext='0' indent=3;
 format race race. sex sex. center $ctr.;
 keylabel n='n' pctn='%' all='TOTAL';
run;
```

```
* Exercise 2c;
proc tabulate noseps;
 class race sex center;
 table race*sex all, (center=' ' all)*
       (n*f=3. pctn<center all>*f=6.2) /
       printmiss rts=12 misstext='0' indent=3;
 format race race. sex sex. center $ctr.;
 keylabel n='n' pctn='%' all='TOTAL';
run;

* Exercise 3;
proc tabulate;
 class race sex center;
 table race=' '*(sex=' ' all),
       (center=' ' all)*
       (n*f=3. pctn<sex all>*f=6.2) /
       printmiss rts=22 misstext='0';
 format race race. sex sex. center $ctr.;
 keylabel n='n' pctn='%' all='Total';
run;
```

Workshop Solutions

```
* Exercise 4;
proc tabulate;
 class race sex center;
 table race=' '*(all sex=' '),
      (center=' ' all)*
      (n*f=3. pctn<sex all>*f=6.2) /
      printmiss rts=22 misstext='0';
 format race race. sex sex. center $ctr.;
 keylabel n='n' pctn='%' all='Total';
run;

*** WORKSHOP 2 ***;
data patients;
 set in.patients;
 if dose='5 mg' then ds=' 5 mg';
 else ds=dose;
run;

* Exercise 1;
proc tabulate formchar='                '
     order=formatted;
 class sex center ds;
 table center='Center' ds='Daily Dose' all,
       sex=' '*(n*f=3. pctn<center ds all>*f=7.2)
       / rts=20;
 format sex sex. center $ctr. ds $char5.;
 keylabel n='N' pctn='Percent'
          all='Total Patients';
run;
```

```
* Exercise 2a, 2b, 2c;
* Exercise 2a;
proc tabulate;
 class center race ds sex;
 table center=' '*(race=' ' all),
       ds='Daily Dose'*(sex=' ' all)*n*f=6. /
       rts=20 printmiss misstext='0';
 format center $ctr. race race. sex sex.;
 keylabel n=' ' all='Total';
run;

* Exercise 2b;
proc tabulate;
 class center race ds sex;
 table center=' '*(race=' ' all),
       ds='Daily Dose'*(sex=' ' all)*
       pctn<ds*sex ds>*f=6.2 /
       rts=20 printmiss misstext='0.00';
 format center $ctr. race race. sex sex.;
 keylabel pctn=' ' all='Total';
run;
```

Workshop Solutions

```
* Exercise 2c;
proc tabulate;
 class center race ds sex;
 table center=' '*(race=' ' all),
       ds='Daily Dose'*(sex=' ' all)*
       pctn<center*race center>*f=6.2 /
       rts=20 printmiss misstext='0.00';
 format center $ctr. race race. sex sex.;
 keylabel pctn=' ' all='Total';
run;
```

The End