

Lab 15 *Some of these problems may be more challenging than others. Please feel free to work with others, attend office hours, or post on the course discussion forum if you need help. While collaboration with other students is encouraged, each student is responsible for submitting his or her own work. This assignment should be submitted in one well-commented SAS program. For any questions that require a written answer, do so in the SAS comments. Be sure to re-name the uploaded SAS scripts according to the naming convention LastnameFirstinitial_Lab#.sas (e.g., PileggiS_Lab15.sas).*

Recall Lab 14 where you created a table of descriptive statistics of the 2012 Olympic Medalists by country using the 02012.sas7bdat data set (this data set name starts with an “oh” and not a zero). In this lab, you are going to follow a series of steps to re-create that table using PROC TABULATE. Skip to page 4 to see an example table.

1. In a comment in your SAS code, briefly describe the programming approach you took to create the table displayed on page 3 in Lab 14.
 - (a) What actions did you do in data steps?
 - (b) What actions did you do in procedures?
2. In a comment in your SAS code, briefly describe your game plan for creating this table with PROC TABULATE.
 - (a) What actions will you need to do in data steps?
 - (b) What actions will you need to do you do in procedures?
 - (c) Briefly, describe the *structure* of the table that you want to create.
 - i. What is the table dimension?
 - ii. What goes on the rows, columns, and pages?
3. Create a SAS library to access the 02012.sas7bdat.
4. Follow the subsequent steps to establish the *structure* of the table from Lab 14 using PROC TABULATE. Your goal for this question is to create the table structure by following the subsequent steps:
 - (a) Use PROC TABULATE to create a table that has rows for different countries and a single column that represents the number of Olympic medalists from that country.

| | |
|-------------------|------------|
| | All |
| | N |
| Country | |
| Australia | 25 |
| Azerbaijan | 1 |
| Belarus | 4 |

- (b) Copy and paste your SAS code from the previous step. Modify this code so that the table now has an additional column that represents the sum of the total number of medals won by that country.

| | | |
|-------------------|--------------|------------|
| | All | |
| | Total | |
| | N | Sum |
| Country | | |
| Australia | 25 | 32.00 |
| Azerbaijan | 1 | 1.00 |

- (c) Copy and paste your SAS code from the previous step. Modify this code so that the table now has three statistics for the total number of medals: sum, average total medals won, and maximum total medals won by an athlete. Your table now has 4 columns.

| | | | | |
|-------------------|--------------|------------|-------------|------------|
| | All | | | |
| | Total | | | |
| | N | Sum | Mean | Max |
| Country | | | | |
| Australia | 25 | 32.00 | 1.28 | 4.00 |
| Azerbaijan | 1 | 1.00 | 1.00 | 1.00 |

- (d) Copy and paste your SAS code from the previous step. Modify this code so that the table now has two additional columns for the average age and average weight of the Olympic athletes.

| | All | | | | | |
|------------|-----|-------|------|------|-------|--------|
| | N | Total | | | age | weight |
| | | Sum | Mean | Max | Mean | Mean |
| Country | | | | | | |
| Australia | 25 | 32.00 | 1.28 | 4.00 | 24.44 | 73.16 |
| Azerbaijan | 1 | 1.00 | 1.00 | 1.00 | 18.00 | 56.00 |

- (e) Copy and paste your SAS code from the previous step. Modify this code so that the table now has two additional columns for the percent of each country's Olympic medalists that are male and female.

The SAS System

| | All | | | | | | | |
|------------|-----|-------|------|------|-------|--------|---------|---------|
| | N | Total | | | age | weight | Gender | |
| | | Sum | Mean | Max | Mean | Mean | F | M |
| | | | | | | | RowPctN | RowPctN |
| Country | | | | | | | | |
| Australia | 25 | 32.00 | 1.28 | 4.00 | 24.44 | 73.16 | 76.00 | 24.00 |
| Azerbaijan | 1 | 1.00 | 1.00 | 1.00 | 18.00 | 56.00 | . | 100.00 |
| Belarus | 4 | 4.00 | 1.00 | 1.00 | 29.50 | 68.25 | 75.00 | 25.00 |

5. Copy and paste your SAS code from the previous step. Modify this code so that the table *header* appears as below (you will *format variable values* in the next step). This requires using various forms of labels.

The SAS System

| Country | # Medalists | Total Medals | | | Age (yrs) | Weight (kg) | Gender | |
|------------|-------------|--------------|-----------------|-----------------|-----------|-------------|--------|--------|
| | | Sum | Ave per Athlete | Max per Athlete | Average | Average | F | M |
| Australia | 25 | 32.00 | 1.28 | 4.00 | 24.44 | 73.16 | 76.00 | 24.00 |
| Azerbaijan | 1 | 1.00 | 1.00 | 1.00 | 18.00 | 56.00 | . | 100.00 |
| Belarus | 4 | 4.00 | 1.00 | 1.00 | 29.50 | 68.25 | 75.00 | 25.00 |
| Belgium | 2 | 2.00 | 1.00 | 1.00 | 26.00 | 61.00 | 50.00 | 50.00 |
| Brazil | 5 | 5.00 | 1.00 | 1.00 | 23.40 | 81.60 | 40.00 | 60.00 |
| Canada | 25 | 32.00 | 1.28 | 4.00 | 24.44 | 73.16 | 76.00 | 24.00 |

6. Copy and paste your SAS code from the previous step. Follow the subsequent steps to modify this code to *format variable values* so that they appear as below.

- (a) Apply the following formats to variable values:

| | |
|-------------------------|--------------------|
| sum of total medals | no decimal places |
| average of total medals | two decimal places |
| max of total medals | no decimal places |
| average age | one decimal place |
| average weight | one decimal place |

- (b) Create and apply a format for gender such values display as “Female” and “Male”.
- (c) Create and apply a picture format for percent such that percents display as rounded to one decimal place with a percent sign.
- (d) Change the display of missing values from period (.) to three horizontal dashes (“—”) by using the `MISSTEXT` option on the `TABLE` statement.

| The SAS System | | | | | | | | |
|----------------|-------------|--------------|-----------------|-----------------|-----------|-------------|--------|--------|
| Country | # Medalists | Total Medals | | | Age (yrs) | Weight (kg) | Gender | |
| | | Sum | Ave per Athlete | Max per Athlete | Average | Average | Female | Male |
| Australia | 25 | 32 | 1.28 | 4 | 24.4 | 73.2 | 76.0% | 24.0% |
| Azerbaijan | 1 | 1 | 1.00 | 1 | 18.0 | 56.0 | — | 100.0% |
| Belarus | 4 | 4 | 1.00 | 1 | 29.5 | 68.3 | 75.0% | 25.0% |
| Belgium | 2 | 2 | 1.00 | 1 | 26.0 | 61.0 | 50.0% | 50.0% |

7. Copy and paste your SAS code from the previous step. Modify this code to highlight the background color of cells that correspond to countries with more than 20 athletes in the color of your choice. (See last page for an example.)
8. Copy and paste your SAS code from the previous step. Modify this code to export your table to a pdf.
9. Copy and paste your SAS code from the previous step. Modify this code to create a macro that allows you to quickly view combinations of styles and colors as follows:
 - (a) Include macro debugging options in your SAS code.
 - (b) The macro should take two parameters: one for the *style* of the pdf, and one for the *color* of the highlighted cells.
 - (c) The file name of the pdf should indicate the *style* and *color* used.
 - (d) The document title should indicate the *style* and *color* used.
 - (e) Execute the macro at least three times:
 - i. *Pearl* style (this is the default style), highlight color of your choice
 - ii. new style of your choice, new highlight color of your choice
 - iii. new style of your choice, new highlight color of your choice
 - (f) Open the pdfs you created. In a comment in your SAS code, note your preferred style/color combination. Upload these pdfs in addition to your SAS code.

Style = Pearl and Highlight Color = Chartreuse

| Country | # Medalists | Total Medals | | | Age (yrs) | Weight (kg) | Gender | |
|---------------------------------------|-------------|--------------|-----------------|-----------------|-----------|-------------|--------|--------|
| | | Sum | Ave per Athlete | Max per Athlete | Average | Average | Female | Male |
| Australia | 25 | 32 | 1.28 | 4 | 24.4 | 73.2 | 76.0% | 24.0% |
| Azerbaijan | 1 | 1 | 1.00 | 1 | 18.0 | 56.0 | --- | 100.0% |
| Belarus | 4 | 4 | 1.00 | 1 | 29.5 | 68.3 | 75.0% | 25.0% |
| Belgium | 2 | 2 | 1.00 | 1 | 26.0 | 61.0 | 50.0% | 50.0% |
| Brazil | 5 | 5 | 1.00 | 1 | 23.4 | 81.6 | 40.0% | 60.0% |
| Canada | 25 | 25 | 1.00 | 1 | 28.2 | 77.8 | 56.0% | 44.0% |
| Colombia | 3 | 3 | 1.00 | 1 | 26.7 | 64.7 | 33.3% | 66.7% |
| Croatia | 4 | 4 | 1.00 | 1 | 23.5 | 94.0 | --- | 100.0% |
| Cuba | 5 | 5 | 1.00 | 1 | 26.4 | 78.0 | 40.0% | 60.0% |
| Czech Republic | 2 | 2 | 1.00 | 1 | 27.0 | 85.5 | --- | 100.0% |
| Democratic People's Republic of Korea | 5 | 5 | 1.00 | 1 | 23.0 | 57.2 | 60.0% | 40.0% |
| Denmark | 7 | 7 | 1.00 | 1 | 29.1 | 76.7 | 14.3% | 85.7% |
| Egypt | 1 | 1 | 1.00 | 1 | 21.0 | 82.0 | --- | 100.0% |
| France | 27 | 33 | 1.22 | 3 | 25.1 | 77.0 | 48.1% | 51.9% |
| Georgia | 1 | 1 | 1.00 | 1 | 20.0 | 66.0 | --- | 100.0% |
| Germany | 38 | 40 | 1.05 | 2 | 27.5 | 81.8 | 28.9% | 71.1% |
| Great Britain | 44 | 44 | 1.00 | 1 | 28.5 | 81.9 | 25.0% | 75.0% |
| Greece | 1 | 1 | 1.00 | 1 | 25.0 | 90.0 | --- | 100.0% |
| Hungary | 4 | 4 | 1.00 | 1 | 26.3 | 68.8 | 25.0% | 75.0% |
| India | 2 | 2 | 1.00 | 1 | 27.5 | --- | --- | 100.0% |
| Indonesia | 1 | 1 | 1.00 | 1 | 23.0 | 62.0 | --- | 100.0% |
| Italy | 14 | 17 | 1.21 | 2 | 29.4 | 76.4 | 35.7% | 64.3% |
| Japan | 22 | 24 | 1.09 | 2 | 23.6 | 67.5 | 40.9% | 59.1% |
| Kazakhstan | 4 | 4 | 1.00 | 1 | 27.3 | 64.8 | 75.0% | 25.0% |
| Lithuania | 1 | 1 | 1.00 | 1 | 15.0 | 64.0 | 100.0% | --- |
| Mexico | 6 | 6 | 1.00 | 1 | 20.2 | 53.2 | 66.7% | 33.3% |
| Mongolia | 2 | 2 | 1.00 | 1 | 27.0 | 86.5 | --- | 100.0% |
| Netherlands | 17 | 18 | 1.06 | 2 | 27.4 | 70.1 | 94.1% | 5.9% |
| New Zealand | 14 | 14 | 1.00 | 1 | 32.5 | 79.0 | 28.6% | 71.4% |
| Norway | 2 | 2 | 1.00 | 1 | 25.0 | --- | --- | 100.0% |
| People's Republic of China | 50 | 53 | 1.06 | 3 | 23.0 | 66.2 | 48.0% | 52.0% |
| Poland | 3 | 3 | 1.00 | 1 | 27.3 | 65.3 | 100.0% | --- |
| Qatar | 1 | 1 | 1.00 | 1 | 41.0 | 70.0 | --- | 100.0% |
| Republic of Korea | 19 | 22 | 1.16 | 2 | 26.8 | 70.3 | 47.4% | 52.6% |

(Continued)