Exercises 9

For these exercises, use SAS data sets stored in a permanent SAS data library.

Fill in the blank with the location of your SAS data library. **If you have started a new SAS session since the previous lab**, submit the LIBNAME statement to assign the libref **ia** to the SAS data library.

```
libname ia '_____';
```

1. **Creating Frequency Reports**

   a. Use PROC FREQ to create a report using the **ia.sanfran** data set that displays the frequency count for each **DepartDay**. Add an appropriate title.

   SAS Output

   ```
                   Flights from San Francisco by Day of Week

                           The FREQ Procedure

                                           Cumulative    Cumulative
       DepartDay    Frequency    Percent    Frequency      Percent
       ─────────────────────────────────────────────────────────────
              1           6      11.54             6        11.54
              2          13      25.00            19        36.54
              3           5       9.62            24        46.15
              4           7      13.46            31        59.62
              5           7      13.46            38        73.08
              6           8      15.38            46        88.46
              7           6      11.54            52       100.00
   ```

   b. Use PROC FREQ to create a report using the **ia.sanfran** data set that displays the frequency count for each **Destination**. Add an appropriate title.

   SAS Output

   ```
                        Flights from San Francisco

                           The FREQ Procedure

                                           Cumulative    Cumulative
       Destination    Frequency    Percent    Frequency      Percent
       ─────────────────────────────────────────────────────────────
       ANC                  10      19.23            10        19.23
       HND                   8      15.38            18        34.62
       HNL                   3       5.77            21        40.38
       RDU                   6      11.54            27        51.92
       SEA                  25      48.08            52       100.00
   ```

c. Use PROC FREQ to create a report using the **ia.sanfran** data set that displays the frequency count for each **Destination** by **DepartDay**.

Partial SAS Output

```
                    Flights from San Francisco

                       The FREQ Procedure

              Table of Destination by DepartDay

         Destination
                 DepartDay

         Frequency
         Percent
         Row Pct
         Col Pct         1|        2|        3|        4|   Total

         ANC             0|        3|        1|        1|      10
                      0.00|     5.77|     1.92|     1.92|   19.23
                      0.00|    30.00|    10.00|    10.00|
                      0.00|    23.08|    20.00|    14.29|

         HND             1|        2|        1|        3|       8
                      1.92|     3.85|     1.92|     5.77|   15.38
                     12.50|    25.00|    12.50|    37.50|
                     16.67|    15.38|    20.00|    42.86|

         HNL             0|        0|        0|        0|       3
                      0.00|     0.00|     0.00|     0.00|    5.77
                      0.00|     0.00|     0.00|     0.00|
                      0.00|     0.00|     0.00|     0.00|

         RDU             2|        1|        1|        0|       6
                      3.85|     1.92|     1.92|     0.00|   11.54
                     33.33|    16.67|    16.67|     0.00|
                     33.33|     7.69|    20.00|     0.00|
```

The presentation of the output may vary depending on the linesize of the page. This is only partial output.

2. Creating Basic Summary Reports

a. Generate a PROC MEANS report using the **ia.sanfran** data set as input to display statistics for the variables **CargoRev** and **TotPassCap** only. Remove any titles currently in effect.

SAS Output

```
                        The MEANS Procedure

  Variable     N          Mean       Std Dev       Minimum       Maximum
  ────────────────────────────────────────────────────────────────────────
  CargoRev    52       33433.50      23731.72       9417.00      84495.00
  TotPassCap  52     203.8076923    52.4494298    150.0000000   267.0000000
  ────────────────────────────────────────────────────────────────────────
```

b. Modify the previous report to display the data for each **Destination**. Limit the number of decimal places in the output to two. The output shown below is only partial output; all statistics should display in your report.

Partial SAS Output

```
                        The MEANS Procedure

                  N
  Destination    Obs    Variable      N          Mean       Std Dev
  ────────────────────────────────────────────────────────────────────
  ANC            10     CargoRev      10       35811.30      4458.74
                        TotPassCap    10         257.60        11.69

  HND             8     CargoRev       8       78625.50      3251.06
                        TotPassCap     8         250.50         8.33

  HNL             3     CargoRev       3       59684.00      3464.64
                        TotPassCap     3         207.00         0.00

  RDU             6     CargoRev       6       37840.00      4787.04
                        TotPassCap     6         267.00         0.00

  SEA            25     CargoRev      25       13813.32      2316.59
                        TotPassCap    25         151.80         4.97
  ────────────────────────────────────────────────────────────────────
```

3. Creating a List Report

Use PROC REPORT and the **`ia.employees`** data set to produce a list report with the following characteristics:

- Output should be sent to the Output window.
- The report should display only the variables **`Division`**, **`City`**, and **`Salary`**.
- Each variable displayed should have a descriptive report column heading.
- Salary should be displayed with dollar signs, commas, and no decimals.
- The columns of the report should be wide enough so that individual data values are not truncated.
- The observations on the report should be ordered by the values of **`Division`**.
- The report should be titled **`Employee Salary Data`**.

Partial PROC REPORT Output

```
                    Employee Salary Data


     Division Name        City Based          Salary
     AIRPORT OPERATIONS   CARY               $29,000
                          CARY               $41,000
                          CARY               $23,000
                          CARY               $17,000
                          CARY               $32,000
                          CARY               $39,000
                          TORONTO            $29,000
                          CARY               $33,000
```

4. Creating a Summary Report

Use PROC REPORT and the **ia.employees** data set to produce a summary report with the following characteristics:

- The report should display only the variables **Division**, **City**, and **Salary**.
- Each variable displayed should have a descriptive report column heading.
- Salary should be displayed with dollar signs, commas, and no decimals.
- The columns of the report should be wide enough so that individual data values are not truncated.
- The observations on the report should be summarized by the values of **City** for each **Division**.
- The report should be titled **Employee Salary Data by Division / City**.

Partial PROC REPORT Output

```
                Employee Salary Data by Division / City


     Division Name         City Based           Salary
     AIRPORT OPERATIONS     AUSTIN              $94,000
                            BRUSSELS            $54,000
                            CARY             $2,510,000
                            COPENHAGEN         $254,000
                            FRANKFURT          $285,000
                            GENEVA              $72,000
                            LONDON             $122,000
                            PARIS              $147,000
                            ROCKVILLE           $79,000
                            ROME               $112,000
                            SYDNEY             $108,000
                            TOKYO               $73,000
                            TORONTO            $137,000
     CORPORATE OPERATIONS   ATLANTA            $105,000
                            CARY               $210,000
```

5. Adding a Grand Total to the Report

Modify the previous report so that a grand total appears with a single line above the total and a double line below the total.

Partial PROC REPORT Output (Bottom of Report)

```
                    PITTSBURGH          $52,000
                    ROCKVILLE           $81,000
                    SAN FRANCISCO       $41,000
                    SAN JOSE            $21,000
                    SINGAPORE           $63,000
                    TOKYO              $101,000
                    TORONTO             $83,000

                                    _____
                                      $16,290,000
                                    =============
```

Creating a One-Dimensional Frequency Report

Use PROC TABULATE and the **ia.employees** data set to produce a summary report that displays a frequency count for the variable **Division** with an appropriate title.

PROC TABULATE Output

```
                                Counts by Division

                   ┌─────────────────────────────────────────────────────────┐
                   │                        Division                          │
                   ├───────────┬───────────┬───────────┬────────────┬─────────┤
                   │ AIRPORT   │ CORPORATE │ CORPORATE │            │ FLIGHT  │
                   │OPERATIONS │OPERATIONS │ PLANNING  │FINANCE & IT│OPERATIONS│
                   ├───────────┼───────────┼───────────┼────────────┼─────────┤
                   │     N     │     N     │     N     │     N      │    N    │
                   ├───────────┼───────────┼───────────┼────────────┼─────────┤
                   │    131.00 │      6.00 │      1.00 │      65.00 │  143.00 │
                   └───────────┴───────────┴───────────┴────────────┴─────────┘

   (Continued)
```

```
                                Counts by Division

                        ┌───────────────────────────┐
                        │          Division          │
                        ├──────────────┬─────────────┤
                        │    HUMAN     │   SALES &    │
                        │  RESOURCES   │  MARKETING   │
                        ├──────────────┼─────────────┤
                        │      N       │      N       │
                        ├──────────────┼─────────────┤
                        │       101.00 │       53.00  │
                        └──────────────┴─────────────┘
```

✎ Depending on the width of your page, the report may span two separate pages, as shown in the output above.

6. Creating a Two-Dimensional Frequency Report

Modify the previous report to

- subset the data to only display divisions that have the word 'OPERATIONS' in the name
- display the variable **City** in the row dimension
- add row and column totals
- add an appropriate title.

PROC TABULATE Output

	Division			
	AIRPORT OPERATIONS	CORPORATE OPERATIONS	FLIGHT OPERATIONS	All
	N	N	N	N
City				
ATLANTA	.	1.00	.	1.00
AUSTIN	3.00	.	1.00	4.00
BRUSSELS	2.00	.	.	2.00
CARY	81.00	2.00	116.00	199.00
COPENHAGEN	8.00	.	.	8.00
FRANKFURT	10.00	.	13.00	23.00
GENEVA	2.00	.	.	2.00
LONDON	4.00	1.00	7.00	12.00
PARIS	5.00	.	.	5.00
PHOENIX	.	1.00	.	1.00
ROCKVILLE	3.00	.	.	3.00
ROME	3.00	.	.	3.00
SYDNEY	3.00	.	2.00	5.00
TOKYO	3.00	.	2.00	5.00
TORONTO	4.00	1.00	2.00	7.00
All	131.00	6.00	143.00	280.00

Counts for Operations Divisions

7. Creating a Report on an Analysis Variable

Modify the previous report to

- display the mean of the variable **Salary** in the column dimension
- display the overall mean of the variable salary in the column dimension
- display the data with dollar signs, commas, and no digits after the decimal point
- add an appropriate title.

PROC TABULATE Output

	Division			
	AIRPORT OPERATIONS	CORPORATE OPERATIONS	FLIGHT OPERATIONS	All
	Salary	Salary	Salary	Salary
	Mean	Mean	Mean	Mean
City				
ATLANTA	.	$105,000	.	$105,000
AUSTIN	$31,333	.	$22,000	$29,000
BRUSSELS	$27,000	.	.	$27,000
CARY	$30,988	$105,000	$32,224	$32,452
COPENHAGEN	$31,750	.	.	$31,750
FRANKFURT	$28,500	.	$34,000	$31,609
GENEVA	$36,000	.	.	$36,000
LONDON	$30,500	$125,000	$45,000	$46,833
PARIS	$29,400	.	.	$29,400
PHOENIX	.	$95,000	.	$95,000
ROCKVILLE	$26,333	.	.	$26,333
ROME	$37,333	.	.	$37,333
SYDNEY	$36,000	.	$28,500	$33,000
TOKYO	$24,333	.	$37,500	$29,600
TORONTO	$34,250	$85,000	$18,000	$36,857
All	$30,893	$103,333	$32,762	$33,400

Average Salaries for Operations Divisions

8. **Creating a Report Using HTML (Optional)**

Modify the previous report to output the report to an HTML file.

PROC TABULATE Output

The SAS System			
	Division		All
	AIRPORT OPERATIONS	CORPORATE OPERATIONS	FLIGHT OPERATIONS	
	Salary	Salary	Salary	Salary
	Mean	Mean	Mean	Mean

Exercises 10

9. Producing Vertical Bar Charts and Pie Charts

For these exercises, use SAS data sets stored in a permanent SAS data library.

Fill in the blank with the location of your SAS data library. **If you have started a new SAS session since the previous lab**, submit the LIBNAME statement to assign the libref **ia** to the SAS data library.

libname ia '_____';

Use the **ia.personl** date set and a WHERE statement to produce the charts requested below for the ticket agents (**JobCode** values of TA1, TA2, and TA3).

```
where JobCode in ('TA1', 'TA2', 'TA3');
```

a. Produce a vertical bar chart that displays the number of male and female ticket agents (**Gender** values are M and F).
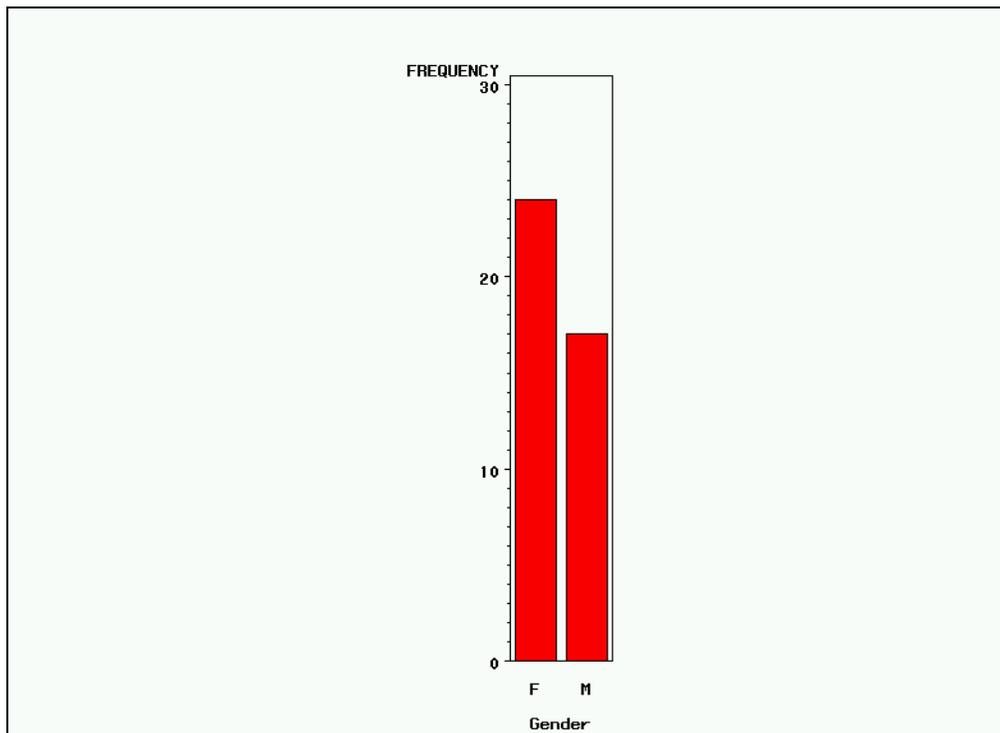
b. Enhance the chart by adding an appropriate title that displays the text in blue with the DUPLEX font.
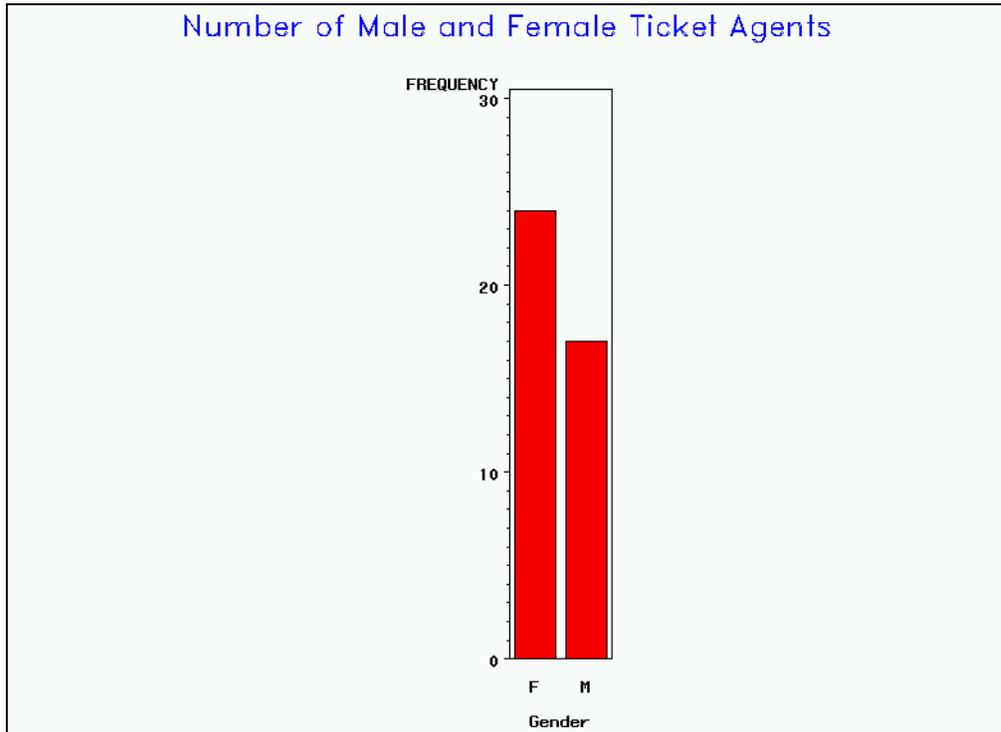
c. Compare the average salaries of each ticket agent job level by showing a solid pie slice for each of the three **Jobcode** values. Add an appropriate title that displays the text in red with the SWISS font.
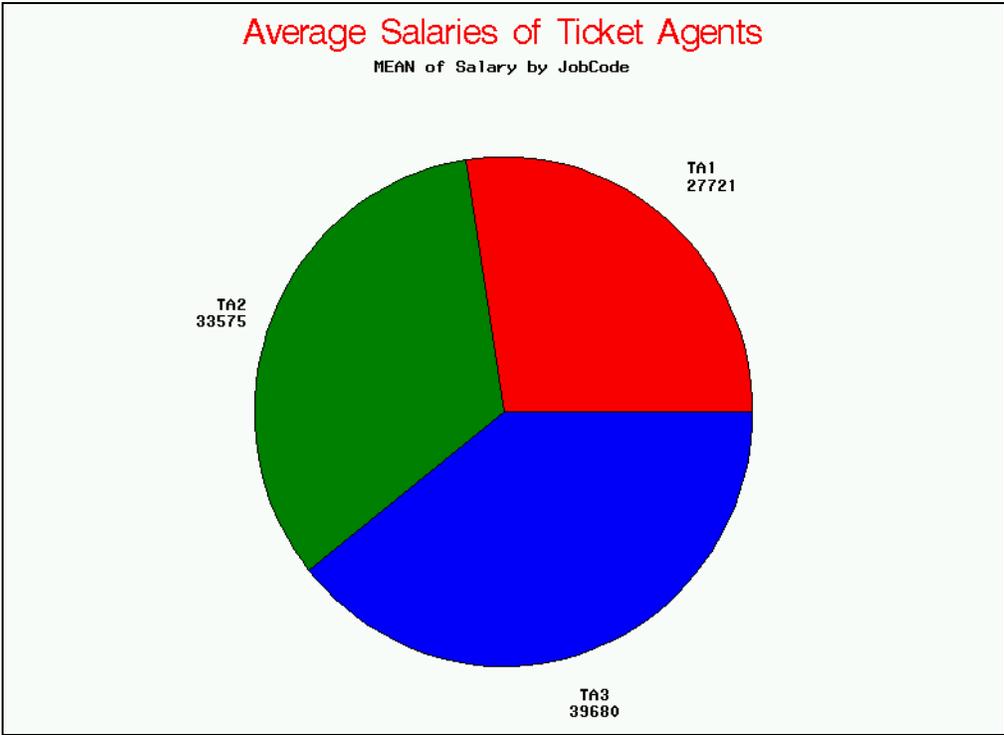
d. Enhance the pie chart by filling the pie slices with crosshatched lines and exploding the slice represents the TA3 value of `JobCode`.
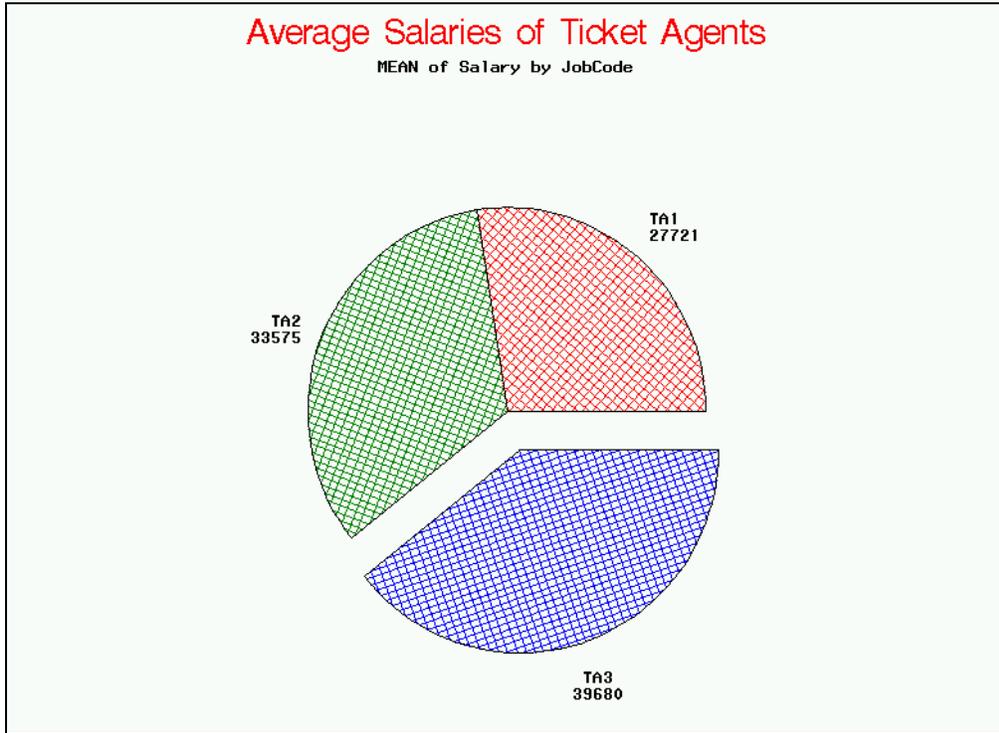
10. Producing a Horizontal Bar Chart (Optional)

Use the **ia.chicago** data set to produce a horizontal bar chart that displays the total number of passengers boarded (**Boarded**) each day of the week. Create a new variable, **Day**, which contains the day of the week, where 1 represents Sunday, 2 represents Monday, and so on.

- Place an appropriate title on the chart.
- Use the label **Day of the Week** for the variable **Day** and the label **Passengers** for the variable **Boarded**.

If the chart did not generate seven bars, add the DISCRETE option to the HBAR statement and generate the chart again.
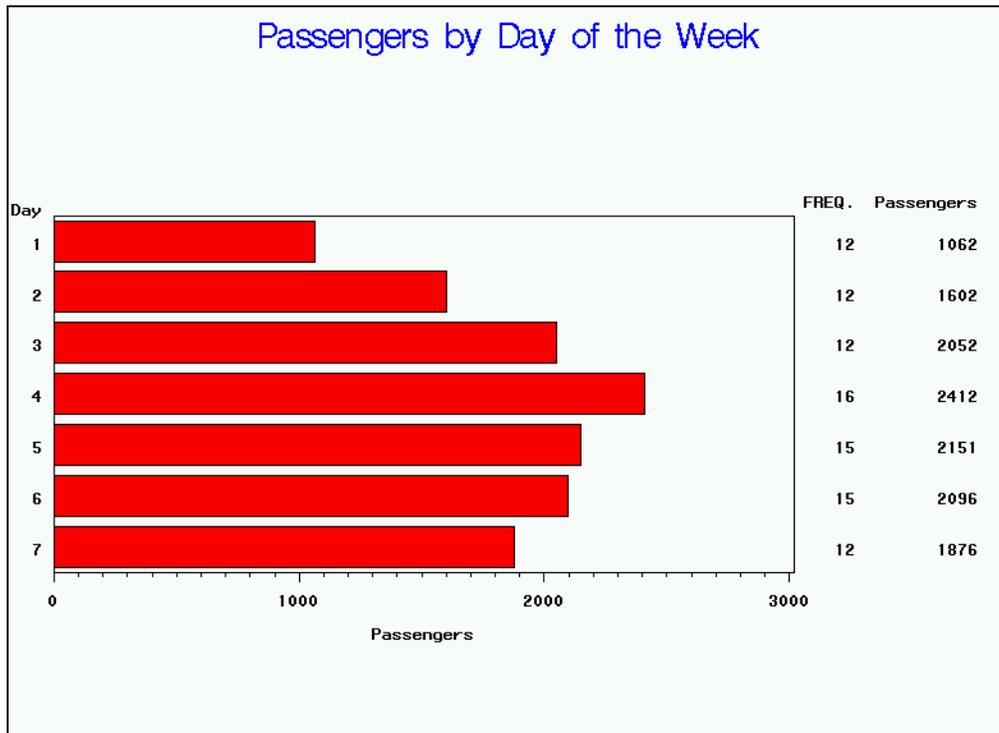
11. Producing a Two-Dimensional Plot

The data set **ia.delay** contains dates and delays in minutes for International Airlines flights. Use the data set and an appropriate WHERE statement to select flights to Copenhagen (**Dest='CPH'**) and produce the plot described below:

- Plot the delays on the vertical axis and dates along the horizontal axis.
- Adjust the scale on the vertical axis to start at –15 and end at 30 with a tick mark every 15 minutes.
- Display the title **Flights to Copenhagen** in red.
- Display the points as red squares.
- Use the NEEDLE interpolation technique to connect the points to the horizontal axis.