# CS 1063 Project 1: Print Conversion Tables

## The `MetricConversion` Class

**Objectives**

**This is one of three major programming projects this semester. You may NOT collaborate on this project. While you may ask for assistance in debugging, this project should be ENTIRELY your own work.**

Other objectives include:

- Use static methods.
- Use local variables.
- Use arithmetic expressions.
- Use Scanner to input values.
- Use for loops.

**Hand-in Requirements**

All projects and laboratories will be submitted electronically through Blackboard. Zip up your entire project directory to submit as the source. (Right click on the project folder and follow **Send To > Compressed (zipped) Folder** or **7-Zip > Add to "project1.zip"**.) The project folder should in clude the following:

- `MetricConversion.java`
- `MetircConversionOutput.txt`

**Tasks**

Write a program called `MetricConversion` that prints

```
Project 1 written by YOURNAME
```

and calls two methods:

1. Print a table converting from kilograms to pounds.
2. Print a table converting from feet and inches to meters. This should go from 0 feet, 0 inches to 9 feet, 11 inches.

**Details**

**Table for Conversion from Kilograms to Pounds.**

For the first method, you should allow the user to enter two integers, indicating the range of the table. For example, the user might want to print a table from 13 kilograms to 42 kilograms.

You can use a for loop that counts from the first number to the second number. In the loop, you can convert the number to pounds using the exact conversion: 1 pound = 0.45359237 kilograms.

Your method should print a title for the table, a header for each column (a kilogram column and a pound column), and a line for each value for kilograms and the corresponding conversion for pounds. Use tab characters (`\t`) to align the columns.

**Table for Conversion from Feet and Inches to Meters**

For the second method, you should print a table as follows (partially shown):

```
Conversion from Feet and Inches to Meters

        Inches
Feet    0       1       2       3       ...
0       0.0000  0.0254  0.0508  0.0762  ...
1       0.3048  0.3302  0.3556  0.3810  ...
2       0.6096  0.6350  0.6604  0.6858  ...
.       .       .       .       .
.       .       .       .       .
.       .       .       .       .
```

That is, you should first print a title and print headers for feet and inches (from 0 to 11 inches). Then you should print 10 lines (from 0 to 9 feet). The first column shows the number of feet. Following columns show the conversion from the number of feet and number of inches to meters.

Let's consider the pseudocode for this method step-by-step. First, we want to print the headers, followed by the 10 lines of the table.

**Pseudocode for Feet and Inches to Meters Method**

1. Print headers.
2. Print conversions as a table.

The lines for the headers need to printed in the right order with the appropriate spacing.

**Pseudocode for Printing Headers**

1. Print title.
2. Print blank line.
3. Print line with "Inches" on it.
4. Print line with "Feet" and the values 0 to 11. There should be tabs between the tokens.

To print the table there needs to be 10 lines, from 0 feet to 9 feet.

**Pseudocode for Printing the Conversions as a Table**

1. For each value of feet from 0 to 9:
    A. Print the number of feet.
    B. Print the remaining numbers for the line. This will be 12 values (one value each from 0 inches to 11 inches).
    C. Print a newline.

The remainder of the line needs to be printed with a loop from 0 to 11.

**Pseudocode for Printing the Conversions on One Row**

1. For each value of inches from 0 to 11:
    1. Print a tab.
    2. Calculate and print the conversion using the exact conversion: 1 inch = 0.0254 meters.

Java will occasionally print a value with many decimal places. For example, 3 times 0.0254 is printed as 0.07619999999999999, which will make it difficult to line up the columns. You can use `System.out.printf` to control how numbers are printed. If the variable `meters` contains the value you want to print, then using:

```
System.out.printf("%.4f", meters);
```

will print `meters` rounded to 4 decimal places.

When creating the output file, `MetricConversionOutput.txt`, using input values 3 and 17.

**Rubric**

- [8 Points] If your program has a method that correctly prints the kilograms to pounds table.
  - [1 Point] For printing the table's title and headers.
  - [2 Points] For prompting the user for two numbers (the table's starting and ending range).
  - [2 Points] For a for-loop that prints each row of the table.
  - [2 Points] For properly converting from kilograms to pounds
  - [1 Point] For properly formatting the table into columns using tabs.
- [8 Points] If your program has a method that correctly prints the feet and inches to meters table.
  - [1 Point] For printing the table's title and headers.
  - [3 Points] For properly nesting the two for loops.
  - [2 Points] For properly converting from feet and inches to meters.
  - [2 Point] For properly formatting the table into columns using tabs, and rounding decimal places.
- [4 points]
  - If the main method of your program prints "Project 1 written by [...]" and calls the two other methods.
  - If your submission was a Zip file named `project1.zip` containing a folder named `project1`, which contains the other files.
  - If your Java program was in a file named `MetricConversion.java`.
  - If the output of your Java program was in a file named `MetricConversionOutput.txt`.
  - If your program contains a comment that describes what the program does and contains a comment for each method.
  - If your program is indented properly.

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