Lab exercise: basics in Matlab, continued

Conversion table, Fahrenheit to Celsius

You plan to travel to the USA on a vacation. There, you will get temperature information in Fahrenheit, and you think it would be useful to bring along a table with Fahrenheit values and the corresponding Celsius values. You use Matlab to generate and print the table and at the same time draw the corresponding information as a graph with Fahrenheit values on the x-axis and the Celsius values on the y-axis. Below you will find step by step guidelines on how to write the table and the draw the graph.

The formula for conversion of Fahrenheit to Celsius is $C = \frac{5}{9}(F-32)$.

To do

1. **Create a vector with Fahrenheit values.**
   You would like the content of the table to include the integers values from 32 to 132 degrees Fahrenheit (equivalent to 0 and approximately 55 degrees Celsius). The easiest way to create a table of values from 32 to 132 is through the command (we store the vector in a variable `Fdegrees`):

   \[ F_{\text{degrees}} = 32:132 \quad \text{or} \quad F_{\text{degrees}} = 32:1:132 \]

   Create the vector in the *Command window*.

   (It is also possible to use `linspace`, but it is harder here as you need to calculate how many numbers it will be in the vector).

2. **Create the corresponding Celsius vector.**
   Now, calculate the corresponding Celsius values and store it in a vector `Cdegrees`:

   \[ C_{\text{degrees}} = \frac{5}{9} \times (F_{\text{degrees}} - 32) \]

3. **Display the vectors in a tabular on the screen**
   In order to lookup Fahrenheit degrees and corresponding Celsius degrees we need a table. The easiest way to do that is to put `Fdegrees` and `Cdegrees` next to each other as columns in a matrix:

   \[ [F_{\text{degrees}} \, C_{\text{degrees}}] \]

   Try it!
   Remember that the quote `´` is the transpose (flip the row vectors to column vectors). The brackets defines the matrix.
Also, add
\[
\text{disp(\texttt{\textasciitilde Fahrenheit to Celsius table:\textasciitilde})}
\]
prior to
\[
\text{[Fdegrees\textasciitilde Cdegrees\textasciitilde]}
\]
and you get a little title before the table.

4. **Plot the table.**
   Finally, make a graph with Fahrenheit values as the x-axis, and Celsius as the y-axis:

\[
\text{plot(Fdegrees,Cdegrees)}
\]

Add title and labels:

\[
\text{title(\texttt{\textasciitilde Fahrenheit and Celsius degrees\textasciitilde})}
\]
\[
\text{xlabel(\texttt{\textasciitilde Fahrenheit\textasciitilde})}
\]
\[
\text{ylabel(\texttt{\textasciitilde Celsius\textasciitilde})}
\]

Add a grid to make it easier to read the graph:

\[
\text{grid on}
\]

5. **Modifying the graph**
   Just for fun, change color and line type by

\[
\text{plot(Fdegrees,Cdegrees,\texttt{:\textasciitilde})};
\]
and
\[
\text{plot(Fdegrees,Cdegrees,\texttt{r:\textasciitilde})};
\]

What happens? You can find available colors and line types in the help documentation: \texttt{doc plot} or \texttt{help plot}.

Play around a little with different line types and colors.