Assignment 1

# **Code structure**

***Forward Substitution Function***

The forward substitution function was implemented in a relatively simple manner, using the provided template. Due to the functions relatively simple structure and few dependencies, a separate header file was not used for this part of the assignment.

If a slightly larger program/function structure was to be based on it, it would however be ideal to split the functions and main program into separate source files as well as a header file. Additionally, the appropriate Makefile could be created for easier future execution.

***Triangular Sylvester Equation***

The Sylvester Equation was implemented in a slightly different manner, with a more separated/better structure.

First of all, the header file “matrix.h” was included to define the matrix\_t structures. The forward substitution function was also included in a separate source file for the Sylvester Equation to simplify the second step of the algorithm.

Again, if a main program was to be written and compiled, an appropriate Makefile could be included in the program structure.

# **Numerical test[[1]](#footnote-1)**

A simple test was run, implementing the functions in a main program and printing the solution to the console, with the following input, , *R*, *b* and *C* (with *b* being input for the forward substitution function and C being input for the Sylvester function):

Producing the following solutions for x and X, respectively:

1. Numerical tests in Appendices. Similar tests were run for checking numerical error and dimension/NULL errors (not included in the appendices). [↑](#footnote-ref-1)