Figure 1: Shows 101 linearly spaced points starting at 0 and ending at 1, evaluated on the excact solution $u(x) = 1 - (1 - e^{-10})x - e^{-10x}$.

# 1 Problem 2 within project 1

We are looking to write a program that defines a vector of x-values, and a function that evaluates the excact solution over these values, the results of which will be stored in 2 columns, with a fixed amount of decimals, in scientific notation. This data will also be plotted using a separate script.

**excact solution**

we require a function that returns $u(x)$ for an input $x$, such that:

$$u(x) = 1 - (1 - e^{-10})x - e^{-10x} \qquad (1)$$

The function "analytic_sol" is declared as the type double, and so is it's (only) parameter "x" too. the function body evaluates $u(x)$ as shown in 1, and returns the result. Vectors x and u were initialized to contain 101 elements doubles, and x was fully defined by assigning each element within a for-loop, iterating through the elements the elements and assigning each one a value. (each element is assigned the value of the previous element plus 1/100, starting at 0, such that $x_{i+1} = x_i$). u was defined using a for loop, calling "analytic_sol" with $x_i$ as the input, such that $u_i = $ analytic_sol$(x_i)$.