Digital twins for automation and collaborative robots
A.Y. 2023/24
Assignment #05

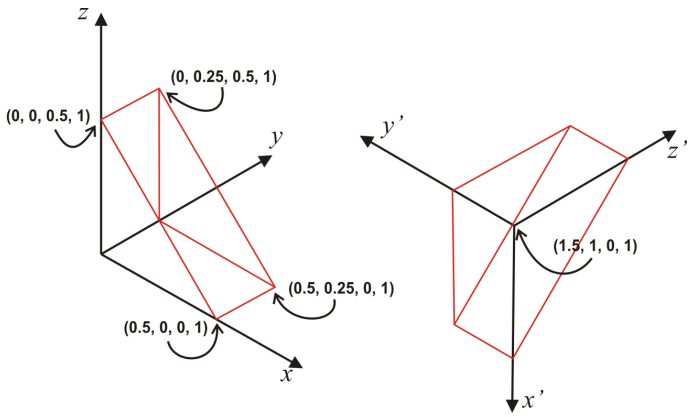
Prepare the solution to the assignment as a single script named as `labXX_NameSurname_ddmmyy.m`. Use the format suggested in Assignment #01. If necessary, you can reuse some functions from previous assignments, and create additional functions. Collect all code in the folder `Assignment_04`.

1. Write the function `draw_frame(T)` that draws in a 3D plot the reference frame associated with the homogeneous transformation matrix $\mathbf{T}$. Test it in the script, showing both the global reference frame (located in $[0, 0, 0]^T$) and the reference frame represented by $\mathbf{T}$.

2. Using the option `nargin` (see Matlab's documentation), add the optional choice of specifying also the length of the three vectors which represent the reference frame to the function `draw_frame`, which therefore can be used both as `draw_frame(T)` and as `draw_frame(T,l)`. Test it in the script.

3. Write the function `link(T1,T2,c)` that draws a line with color `c` that links the origins of the reference frames identified by $\mathbf{T}_1$ and $\mathbf{T}_2$. The function `link(T1,T2,c)` should work with 4 inputs as well, as: `link(T1,T2,c,s)`, being `s` the size of the reference frame. Test it in the script, by drawing the two reference frames and the link.

4. **Optional:** Consider the wedge-shaped object in the following drawing.



Find the transformation that should be applied to take it from the origin (left) to its final location (right). Use the Euler $ZY'Z''$ convention. Test it in the script, by displaying the first and the second object in the same 3D plot, together with the two reference frames.