In this project we will compute the distances between several protein structures. The coordinates of the alpha carbons (CA) of 8 proteins are attached. For each pair we wish to compute the distance between the two after optimal translation and rotation. The proteins are of different lengths, and part of the project is to find the optimal “sliding”. Let the two protein lengths be $N_1$ and $N_2$ ($N_1 < N_2$). We will search for a minimal distance between the two proteins using only $N_1$ CA-s. For the longer protein the following segments: $(1,...N_1),(2,...,N_1+1),\ldots,(N_2-N_1+1,...,N_2)$ will be tried and only the segment with the smallest distance will be kept.

A. Write a matlab function to slide two structures of different lengths
B. Prepare a matlab function to compute the translation and the rotational corrections. It is recommended to use the svd facility of matlab
C. Check that the rotation is proper, and correct it if it is not.
D. Report a table of all the distances $D_{AB}$ of all the distances. Normalized the distances by the length of the protein, $D_{AB} = \sqrt{\frac{\sum_{i=1}^{N} (r_i^A - r_i^B)^2}{N}}$
E. Prepare a picture of the best overlapping and worse overlapping pairs.