The goal of this problem is the implementation and testing of a simultaneous localization and mapping (SLAM) system for a robot equipped with a LIDAR. Assume the LIDAR provides range measurements along 61 angles from $-30°$ to $30°$ with a $1°$ step and centered with the robot forward axis.
The `data_slam.txt` contains data from the robot while moving in a rectangular room. The first three columns are the pose of the robot (x, y, .and θ – exact values), the next three columns are the measured variations of the robot pose, and the last 31 columns are the LIDAR measurements (assumed instantaneous).

Task1
Implement an algorithm that processes each LIDAR measurement (61 angles) and detects corners. Process all the measurements and locate the detected corners with respect to the robot position. Using the exact location of the robot build a map with the four corners fo the room.

Task2
Considering that the initial pose of the robot is known (pose at the initial instant) design and implement a procedure to estimate in real time the evolution of the robot based only on the variations of the robot pose. Compare the results with the exact coordinates of the robot.

Task3
Design and implement a system that processes the variations of the robot pose and also the LIDAR readings to estimate in real time the pose fo the robot as well as the locations of the rooms corners. Whenever a corner is detect check whether it is a known one or not (define a condition for that) and in this last case update the state of the filter. Compare the results obtained with the exact pose of the robot.