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CS 460
10/13/19

Problem 1

In our implementation of the multilateration function, we first parsed and saved the input values into 4 points (p1, p2, p3, p4) and the four radial distances (r1, r2, r3, r4). After that we check if the points were unique, we throw an error if there if the trilateration is impossible find.

We created four cases based on how many of the fours points were unique. If all four of the points were unique, we use the standard trilateration algorithm used in 2D. By using the trilateration algorithm, I save variables and reduce the equations by eliminating the possible sample space from a sphere with one point, to a circle with two points, to two points with three points, and finally to a one point with four points.

In special cases, it is possible to solve for trilateration given just three unique points. Similarly, when there are two unique points (say p1 and p2) with radial distances r1 and r2 respectively, it is only possible to find the point when p1 and p2 have a distance of exactly r1+r2. Finally, when there is only one unique point, we check if the radial distance (r1) is equal to zero. Otherwise, it is impossible to find and our program.