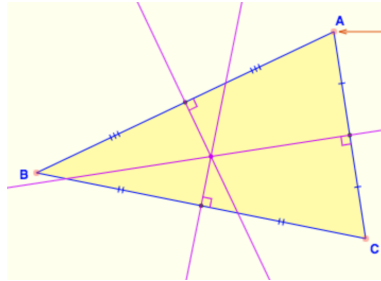**Assignment 6: Marching Cubes Mesh Quality**

The *circumcenter* of a triangle is defined as the point where the three perpendicular bisectors of a triangle meet, as illustrated in the figure below. The circumradius is the distance from the circumcenter to a vertex of the triangle.

The *incenter* is the intersection of the angle bisectors of the three vertices of the triangle, as depicted in the figure below. The inradius r is obtained by dropping a perpendicular from the incenter to any of the triangle edges.
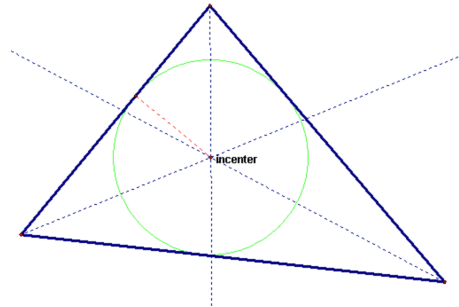
The quality of a triangle can be measure by the ratio q = 2r/R.

The area of a triangle surface can be measured by summing up the area of all its triangles.

For this assignment, you should:

1. Build a code to compute the circumradius and inradius of a triangle.
2. Build a code to compute the area a of triangle mesh
3. Using the marching cube to extract the isosurface of an implicitly function of your choice.
   - Computed the histogram of triangle quality of the extracted mesh using the ratio q = 2r/R as quality measure.
   - Compute the area of the surface
4. Apply the Laplace smoothing in the surface extracted in item 3 and compare the triangle quality histogram and the area of the original surface against the smoothed surface.
5. Apply the Laplace smoothing k times (use k = 2,4,6,8 e 10) and compute quality histograms and the areas of the further smoothed meshes. Discuss the results you have obtained trying to explain the observed results.