Enclosing Mesh Simplification (start early!) \{100 points\}

Your task is to simplify/decimate the input watertight mesh $M$ such that the lower-resolution output fully encloses $M$. Implement the classic decimation pipeline where legal edges extracted from a priority queue $P$ are collapsed sequentially. $P$ is keyed based on edge length, curvature (see my slide 60), or $(d_1+d_2)/2$ where $d_{1/2}$ is the distance from the edge midpoint to the local tangent plane of edge endpoint1/2. Either during collapses or after completing all the collapses, inflate the new point in its normal direction as long as it stays inside $M$. Use Generalized Winding Numbers Eq. 5 for the inside/outside test. Decimate $M$ with 3 keys and 2 inflation decisions above, until it has 50%, 20%, 10%, or 5% of the original face count.

Submission This assignment constitutes 20% of your final grade. Good luck. Test with the meshes in https://segeval.cs.princeton.edu and send to ys@ceng.metu.edu.tr your code, executable, and a report containing screenshots as well as your interesting observations.

References you may want to check first:
Nested Cages, 2015.
Simplification Envelopes, 1996.

\[^1\text{You may use my implementation as a reference: https://user.ceng.metu.edu.tr/~ys/winding-ys.cpp}\]