Problem 1 We are to clip the triangle T with vertices $P,\ Q,\ R$ to the half-space H, where $P = (2,\ 3,\ 0,\ 3),\ Q = (5,\ 2, -9,\ 3),\ R = (1,\ 11, -25,\ 7)$ in clip coordinates, and $H = [1, 7, 9, 14]$ in normalized device coordinates

(a)Classify the points $P,\ Q,\ R$ with respect to H. That is, which of these points lie inside, and which points lie outsize of H?

(b)Find the intersection points (if any) between the edges of T and ∂H.

(c)Find the consecutive vertices of the resulting polygon.

Problem 2 We are to clip the triangle T with vertices $P,\ Q,\ R$ to the half-space H that corresponds to the near face of the camera view frustum, where $P = (8, -12,\ 8,\ 4),\ Q = (8,\ 12, -20, -16),$ $R = (20, -36, -4, -8)$ in clip coordinates.

(a)Find a homogeneous coordinate representation of H. Recall that with OpenGL conventions, the near plane is $z = -1$ and the far plane is $z = 1$ in NDC. Be careful of the inverted z-axis.

(b)Classify the points $P,\ Q,\ R$ with respect to H. That is, which of these points lie inside, and which points lie outside of H?

(c)Find the intersection points (if any) between the edges of T and ∂H

(d)Find the consecutive vertices of the resulting polygon.

Problem 3 Considering triangle T with vertices in (device) clip space given by $P = (10,\ 15,\ 20,\ 5)$, $Q = (6,\ 9,\ 12,\ 3)$, $R = (7,\ 14,\ 21,\ 14)$ and with scalar values $v_P = 60$, $v_Q = 162$, $v_R = 154$ associated to each vertex. We are to clip T to the half-space $H = [1, 2, 3, -13]$ in device space. What are the vertices and associated scalar values of the clipped polygon?