A cubic Bézier curve $C(t) = \sum_{i=0}^{3} b_i B_i^3(t)$, $0 \leq t \leq 1$, can be approximated by a polygonal curve $L^h(t)$ connecting a sequence of curve points $C(t_i^h) = C(i/2^h)$, for $i = 0, \ldots, 2^h$, within an approximation error bound (Filip et al., CAGD 1986):

$$\|C(t) - L^h(t)\| \leq \frac{3}{4} \cdot \frac{1}{4^h} \cdot \max (\|b_0 - 2b_1 + b_2\|, \|b_1 - 2b_2 + b_3\|) = \epsilon_h.$$

More precisely, each line segment $L_i^h(t)$, $(t_{i-1}^h \leq t \leq t_i^h)$, approximates the corresponding curve segment $C_i^h(t) = C(t)$, $(t_{i-1}^h \leq t \leq t_i^h)$, within the error bound $\epsilon_h \geq 0$.

**Part I:** Design an interactive system that can show the BVH structure (i.e., the AABB tree and the LSS tree) for the Bézier curve $C(t)$, $0 \leq t \leq 1$. Display the rounded AABB bounding volumes generated by expanding the AABB containing each line segment $L_i^h(t)$ by $\epsilon_h$. Moreover, display the LSS bounding volumes generated by sweeping a disc of radius $\epsilon_h$ along each line segment $L_i^h(t)$, for the levels $h = 2, \ldots, 10$.

**Part II:** Design an interactive system that can control the position of a query point $Q$ and the shape of $C(t)$ by dragging the four control points $b_i$. Moreover, implement a recursive algorithm for computing the projection line from $Q$ to the nearest point on the curve $C(t)$. Display the bounding volumes that have been used in the search for the nearest point $C(t)$ by the recursive algorithm.