Shape of the region to the left of sweep line after processing $v_i$: “Funnel”

1. Two monotone chains (upper and lower) starting from the left-most vertex $u$
2. The chain that ends in $v_i$ is a reflex chain
3. The other chain has one edge whose other vertex lies to the right of $v_i$
Case 1 ($v_{i+1}$ not on reflex chain): add diagonals from $v_{i+1}$ to all vertices on the reflex chain.
Case 2 ($v_{i+1}$ on reflex chain): add diagonals from $v_{i+1}$ to previous vertices on reflex chain until a reflex vertex is formed.
Algorithm:

- Sort all vertices of the x-monotone polygon by ascending x coordinates as \( v_1, \ldots, v_n \)
- Initialize a stack \( S \) (reflex chain), push \( v_1 \) and \( v_2 \) into \( S \)
- For \( i=2 \) to \( n-2 \)
  - If \( v_{i+1} \) and top of \( S \) are on different chains (i.e., Case 1)
    - Pop all vertices from \( S \)
    - Create a diagonal from each popped vertex (except last one) to \( v_{i+1} \)
    - Push \( v_i \) and \( v_{i+1} \) into \( S \)
  - Else (i.e., Case 2)
    - Pop a vertex from \( S \)
    - Pop vertices from \( S \) and create diagonal to \( v_{i+1} \) as long as no new reflex vertices are formed
    - Push \( v_{i+1} \) to \( S \)