Proposition: Let E be an unsorted set of n segments that are the edges of a convex polygon. Describe an $O(n \log n)$ algorithm that computes from E a list containing all vertices of the polygon, sorted in clockwise order.

Proof. Let $E = \{e_1, \ldots, e_n\}$ defined as $e_i = p_i q_i$ where p_i and q_i are the end points of the line segments and $p_i < q_i$ using lexographic ordering. Now define a ordering on the elements of E by $e_i < e_j$ if and only if $p_i(x) < p_j(x)$ or $p_i(x) = p_j(x)$ and $q_i(y) < q_j(y)$.

Algorithm Vertices of polygon of edges Input: E Output: a ordered list of vertices of the polygon of E is clockwise order

1. Order E by the relation above so that $E = \{S_1, \ldots, S_n\}$.
2. Let $\mathcal{L}_U$ be a set and let p_1, q_1 from S_1 be put in to it.
3. keep = q_1
4. For $i = 1$ to n
5. if p_i =keep, then add q_i in to $\mathcal{L}_U$
6. keep=q_i.
7. let $\mathcal{L}_L$ be the lower vertices and put keep in to it from the last loop
8. for $i = n$ to 1
9. if q_i=keep
10. then add p_i to $\mathcal{L}_L$, keep=p_i.
11. Delete the last and first points in $\mathcal{L}_L$ and we can take the order list as $\mathcal{L}_U \cup \mathcal{L}_L$.