The Convex Hull

The Convex Hull of a shape (set of points) is the smallest convex set that contains it. It is a shape that has no holes and covers all the set of points. The points that are part of the Convex Hull contain all the remaining points of the set inside of the resulting shape.

Algorithm: Convex Hull

Input: P: Set of points in a 2D plane
Output: CH: List with the vertices of the *Convex Hull* with orientation *CW*

1 **Sort** the points in lexicographic order, resulting in the sequence $p_1, \cdots, p_n$
2 **Append** the points p_1 and p_2 in a list U, with p_1 as the first point.
3 **For** $i \leftarrow 3$ **until** n **:**
4 | **Append** p_i to U
5 | **While** U *has more than two points* ***and*** *the last three* ***do not*** *form a CCW turn* **:**
6 | | **Delete** the penultimate point of U
7 **Repeat** from step 2, but now with a new list L, starting from right to left, with starting points p_n and p_{n-1}.
8 **Delete** the first and last point of L to avoid the duplicates in U.
9 **Join** U with L to form the Convex Hull CH.
10 **Return** CH