

## 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.

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**Algorithm:** Convex Hull

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**Input:** **P:** Set of points in a 2D plane

**Output:** **CH:** List with the vertices of the *Convex Hull* with orientation *CW*

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1 Sort the points in lexicographic order, resulting in the sequence  $p_1, \dots, p_n$ 
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  $CH$ 
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