

### Algorithm CONVEXHULL( $P$ )

*Input.* A set  $P$  of points in the plane.

*Output.* A list containing the vertices of  $\mathcal{CH}(P)$  in clockwise order.

1. Sort the points by  $x$ -coordinate, resulting in a sequence  $p_1, \dots, p_n$ .
2. Put the points  $p_1$  and  $p_2$  in a list  $\mathcal{L}_{\text{upper}}$ , with  $p_1$  as the first point.
3. **for**  $i \leftarrow 3$  **to**  $n$
4.     **do** Append  $p_i$  to  $\mathcal{L}_{\text{upper}}$ .
5.     **while**  $\mathcal{L}_{\text{upper}}$  contains more than two points **and** the last three points in  $\mathcal{L}_{\text{upper}}$  do not make a right turn
6.         **do** Delete the middle of the last three points from  $\mathcal{L}_{\text{upper}}$ .
7. Put the points  $p_n$  and  $p_{n-1}$  in a list  $\mathcal{L}_{\text{lower}}$ , with  $p_n$  as the first point.
8. **for**  $i \leftarrow n - 2$  **downto** 1
9.     **do** Append  $p_i$  to  $\mathcal{L}_{\text{lower}}$ .
10.     **while**  $\mathcal{L}_{\text{lower}}$  contains more than 2 points **and** the last three points in  $\mathcal{L}_{\text{lower}}$  do not make a right turn
11.         **do** Delete the middle of the last three points from  $\mathcal{L}_{\text{lower}}$ .
12. Remove the first and the last point from  $\mathcal{L}_{\text{lower}}$  to avoid duplication of the points where the upper and lower hull meet.
13. Append  $\mathcal{L}_{\text{lower}}$  to  $\mathcal{L}_{\text{upper}}$ , and call the resulting list  $\mathcal{L}$ .
14. **return**  $\mathcal{L}$