

Assignment 1

Part B:

Yes, it will find the convexity of polygon. Algorithm checks the consecutive triplet of points. If in any of the triplet 3rd point appears on the right of line segment formed by first two points in counter clockwise direction, then it will return false. The reason it returns false is because the line between first point and 3rd point can include the 2nd point inside the polygon. If this condition doesn't arise even after processing all the points then, it concludes the polygon is convex.

Part D:

To implement Deque, I have used array where top and bot pointers represents two ends of the queue. While insertion and push operation bot is decremented, and top is increment respectively. On the other hand, while remove and pop operation bot is incremented, and top is decremented respectively. Hence all four operations takes constant time to run [$O(1)$].

Part E:

Assuming rightmost end top and leftmost is bottom of the queue. Also, I am assuming that points pass to the algorithm is in **Iteration Queue contents**

1. A, C
2. A, C, E
3. A, C, D
4. A, C, D, G
5. A, C, D, G, H
6. A, B, D, G

Part G:

The algorithm offering complexity of $O(n \log n)$ will sort the points based on either of the coordinates of the point.

Each point can be put into the deque at most twice (once at each end). Hence each element can be removed at most twice. And each of these decisions is taken by orientation function which runs in constant time. Also, all queue related operations runs in constant time. So, complexity of InsideHull algorithm is $O(n)$. It Doesn't contradict with runtime.