

4.

Pick two points that are most definitely not in the convex hull. This can be done by calculating the centroids of both of the convex hulls and then finding the point in P closest to the centroid of Q and the point in Q closest to the centroid of P. Since these are the inner points they will not be in the final convex hull. We will use these two points to determine where to join P and Q when doing the second part of Graham's scan. Since the second part of Graham's scan is $O(n)$, the total runtime is $O(n + m)$.

old/wrong

Pick one point that will be part of the convex hull. Similarly to Graham Scan, you can pick the coordinate with the smallest Y coordinate, then compute the angle from that coordinate to that of every other coordinate. This can be done in $O(m + n)$ time since there are $m + n$ points with a constant amount of work for each point.