

### Masochist Keith Solution - Alan Yan

The naive way to do this problem is to compute every possible distance and pick the largest one. This is  $O(n^2)$ . Too slow dude!

We use the following lemma

**Lemma.** If  $X$  is a finite subset of  $R^2$ , then  $diam\ X = diam\ hull(X)$  where  $hull(\cdot)$  denotes the convex hull of  $\cdot$ .

*Proof.* [Trivial](#).

We can find convex hull in  $O(n \log n)$  using a [Graham Scan](#). It suffices to find the diameter of a convex polygon quickly. This can be done in  $O(n)$  using well-known algorithms. This is fast enough.