Geometric Intersection

Halfplane Intersection Construction

- Divide-And-Conquer

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Construct_Intersection_Of(H)

```
If |H| == 1, then just return the single halfplane                    //base

Split H evenly into subsets H1 and H2                                  //divide

Let C1 = Construct_Intersection_Of( H1 )                               //recurse

Let C2 = Construct_Intersection_Of( H2 )                               //recurse

Intersect the convex polygons C1 and C2                                //merge

   into a single convex polygon C   //by any generalized CPIC algorithm

return C
```

Complexity

- Just as mentioned earlier,

  the intersection of 2 convex polygons can be constructed in $\mathcal{O}(n)$

- So we have

  $T(n) = 2*T(n/2) + \mathcal{O}(n)$, which solves to

  $T(n) = \mathcal{O}(n\log n)$

- The intersection of n halfplanes can be constructed in $\Theta(n\log n)$ time

- By the lower bound of HIC, this is a worst-case optimal algorithm