

Convex Hull

Graham Scan: Analysis - Simplification

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Sorting By Angles?

❖ For any points i and j

$$\theta(i) < \theta(j)$$

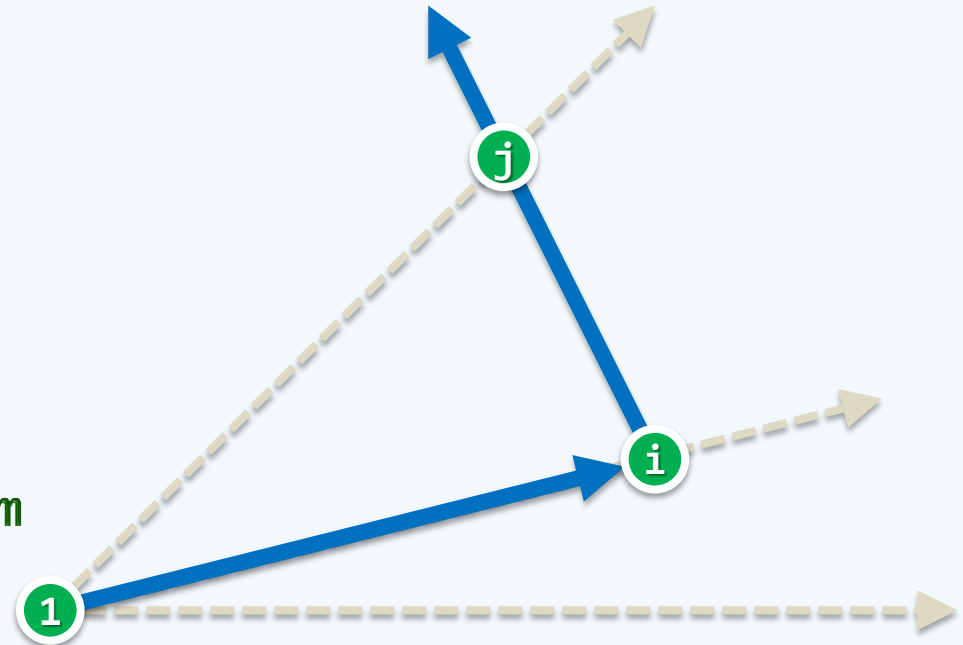
is essentially equivalent to

$$\text{toLeft}(1, i, j) = \text{true}$$

❖ So based on a generic sorting algorithm

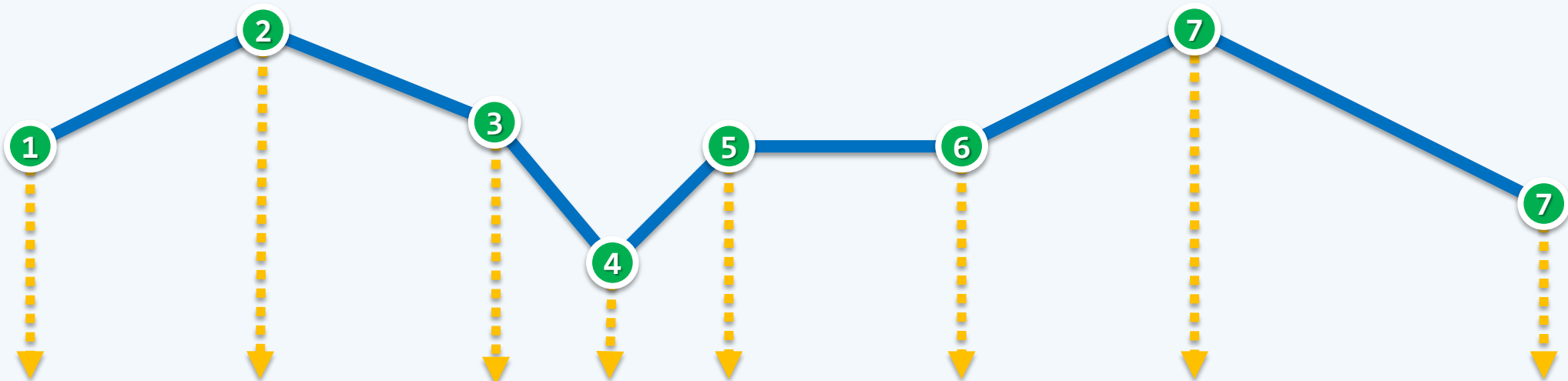
the only thing we should do is

to replace its comparator with the `toLeft()` test



x-Sorted Sets

- ❖ Imagine that the origin were moved vertically to $(0, -\infty)$
 - Each x-monotone chain is a star-shaped polygon
 - `ToLeft()` test is essentially the same as x-comparison

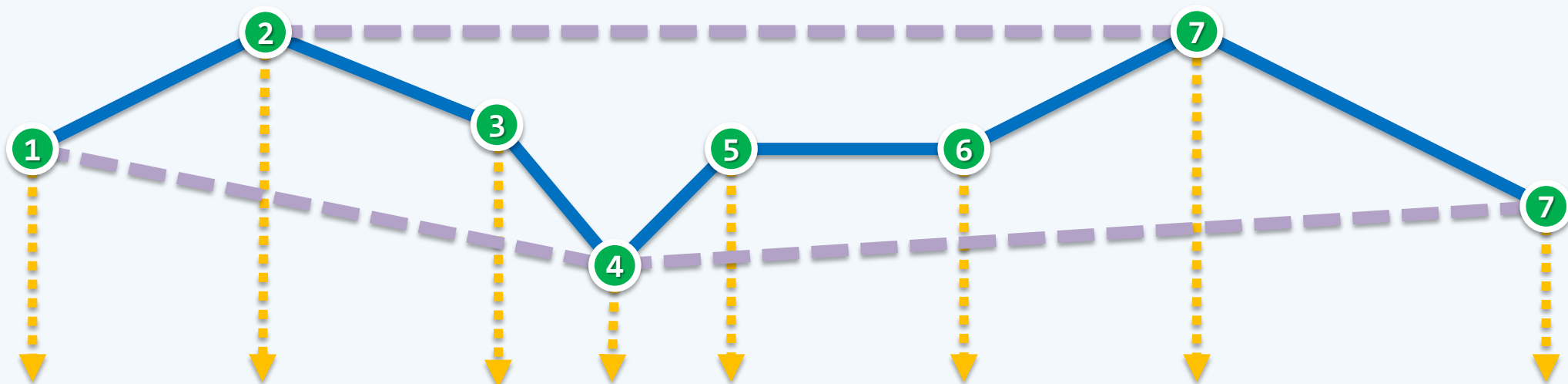


Upper/Lower Hulls

❖ Graham scan will then give the **upper hull**

If we can get also the **lower hull**

...



Simple Polygons

- ❖ [Sk172] J. Sklansky, Measuring Concavity on a Rectangular Mosaic
- [Byk78] A. Bykat, Convex Hull of a Finite Set of Points in Two Dimensions
- ❖ [Sha77] M. I. Shamos, Problems in Computational Geometry
- [MA79] D. McCallum and D. Avis
A Linear Time Algorithm for
Finding the Convex Hull of a Simple Polygon
- ❖ [Sk182] J. Sklansky, Finding the Convex Hull of a Simple Polygon
- [TG83] G. T. Toussaint and H. E. Gindy, A Counterexample to an Algorithm
for Computing Monotone Hulls of Simple Polygons
- ❖ [Lee83] D. T. Lee, On Finding the Convex Hull of a Simple Polygon
- ❖ [GY83] R. Graham and F. F. Yao,
Finding the Convex Hull of a Simple Polygon