## Permutations and Circles

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Choose n points from a circle — no two with the same x-coordinate or y-coordinate (as would happen almost surely if the points were chosen uniformly at random) — label them 1-n by height, reading bottom-to-top, and record these labels reading left-to-right. For example, the set of points shown on the left below gives the permutation 45312, a plot of which is on the right. A permutation is said to be *drawn from (or, on)* a circle if it can be produced by this procedure.



It is clear that the set of permutations which can be drawn from a circle is a closed class. We characterise these permutations and answer the following questions:

- What is the basis of this class?
- How many permutations of each length can be drawn from a circle?

We then examine several other classes constructed in a similar manner.