Geometric Balance

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- **Representing Directions and Movements:** We consider movement along four principal directions (North–South, East–West, Northeast–Southwest, and Northwest–Southeast). Each step can be viewed as a combination of these four directions. We return to a point if, when summed over all movements, there is no net displacement in any of these four directions.

- **Merging Consecutive Segments:** We start with a sequence of line segments. If two consecutive segments share a common endpoint and point in the same direction, we merge them into a single, longer segment. We repeat this process until no further merging is possible, resulting in a simpler representation of the picture.

- **Checking for Identical Pictures Under Rotation:** We want to see if the given picture can be matched to itself after certain rotations. We will test three possible rotation angles:

  - 45 degrees
  - 90 degrees
  - 180 degrees

  If none of these rotations produce the original configuration, we conclude that only a full 360-degree rotation brings the picture back to itself.

- **Comparing the Sets of Segments After Rotation:** For each rotation we test:

  1. Rotate all segments by the chosen angle.
  2. Translate the rotated figure so that the lexicographically smallest endpoint matches the smallest endpoint of the original configuration.
  3. Compare the resulting set of segments to the original. If they match, we have found a rotation that maps the picture onto itself.

  If no tested rotation (45°, 90°, 180°) results in a match, the answer is effectively 360°.