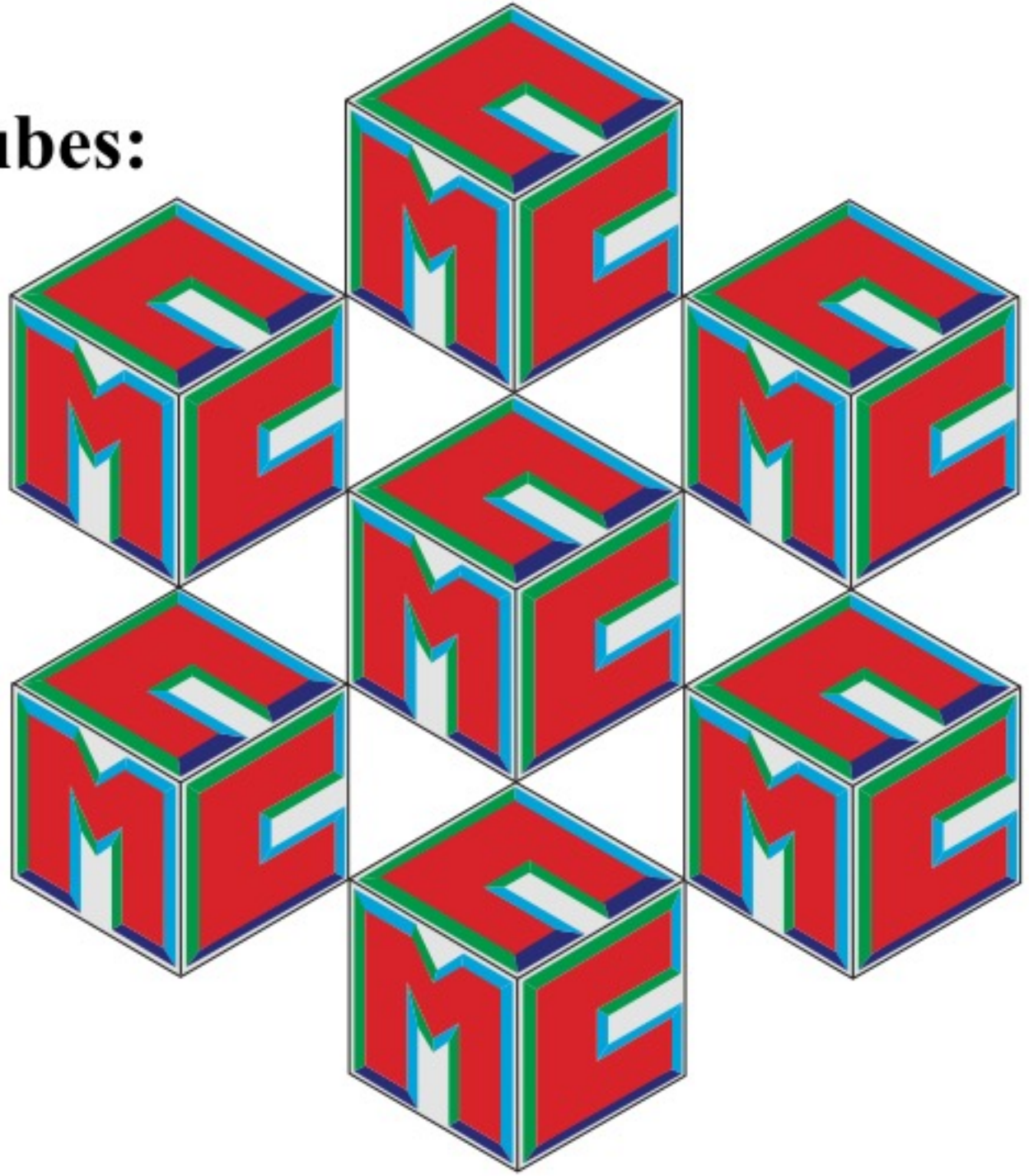
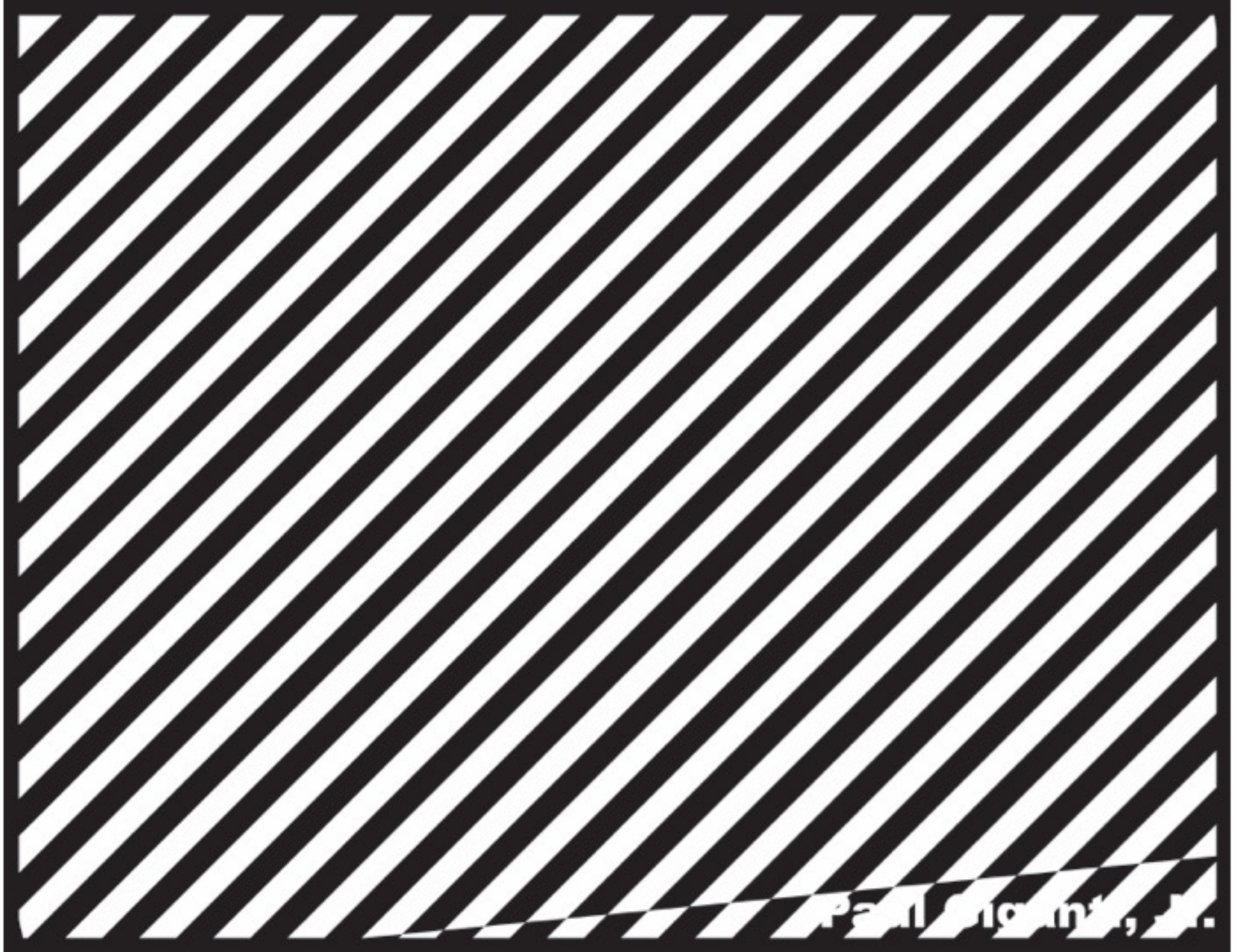
Rose of CMC Cubes:

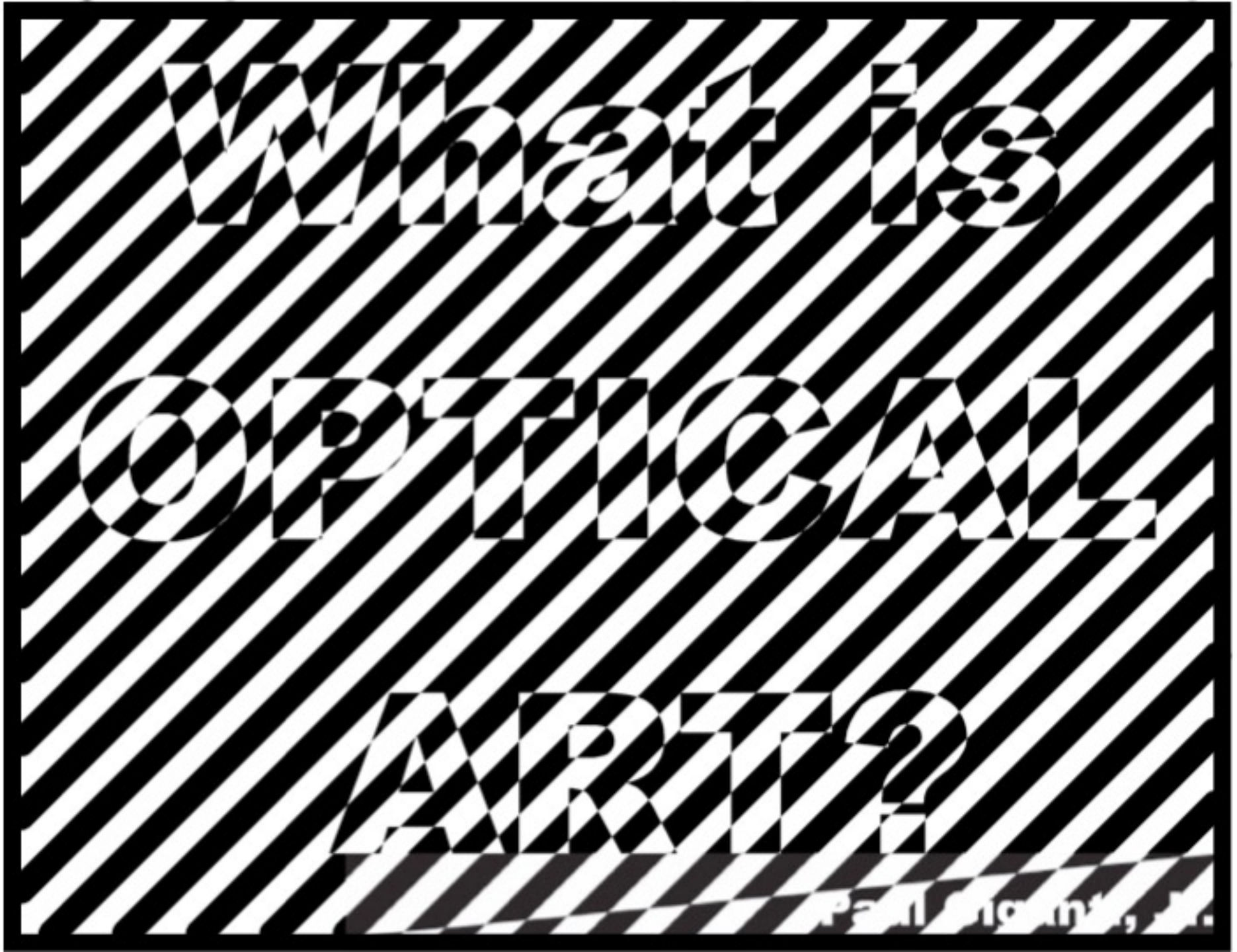


Paul Giganti, Jr.



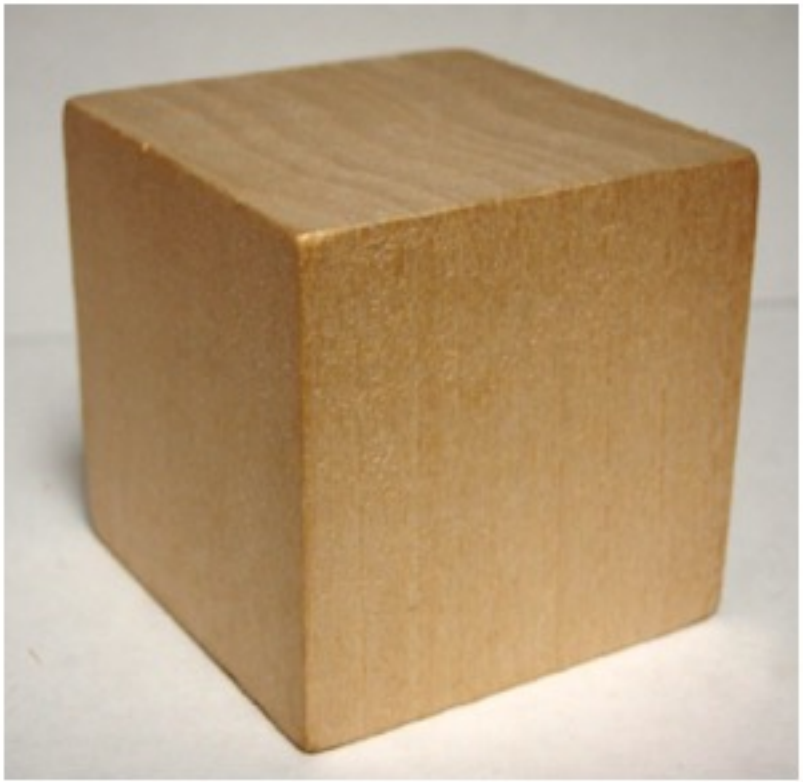
OPTICAL ART

OPTICAL ART For Kids!

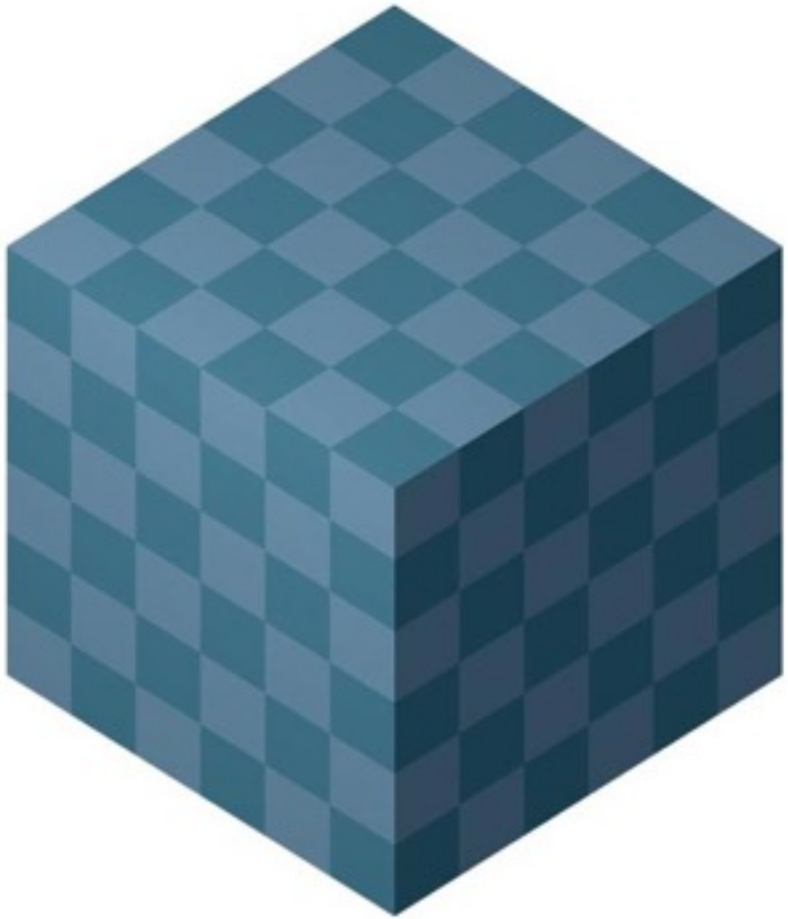

What is
OPTICAL
ART?

This a real cube:

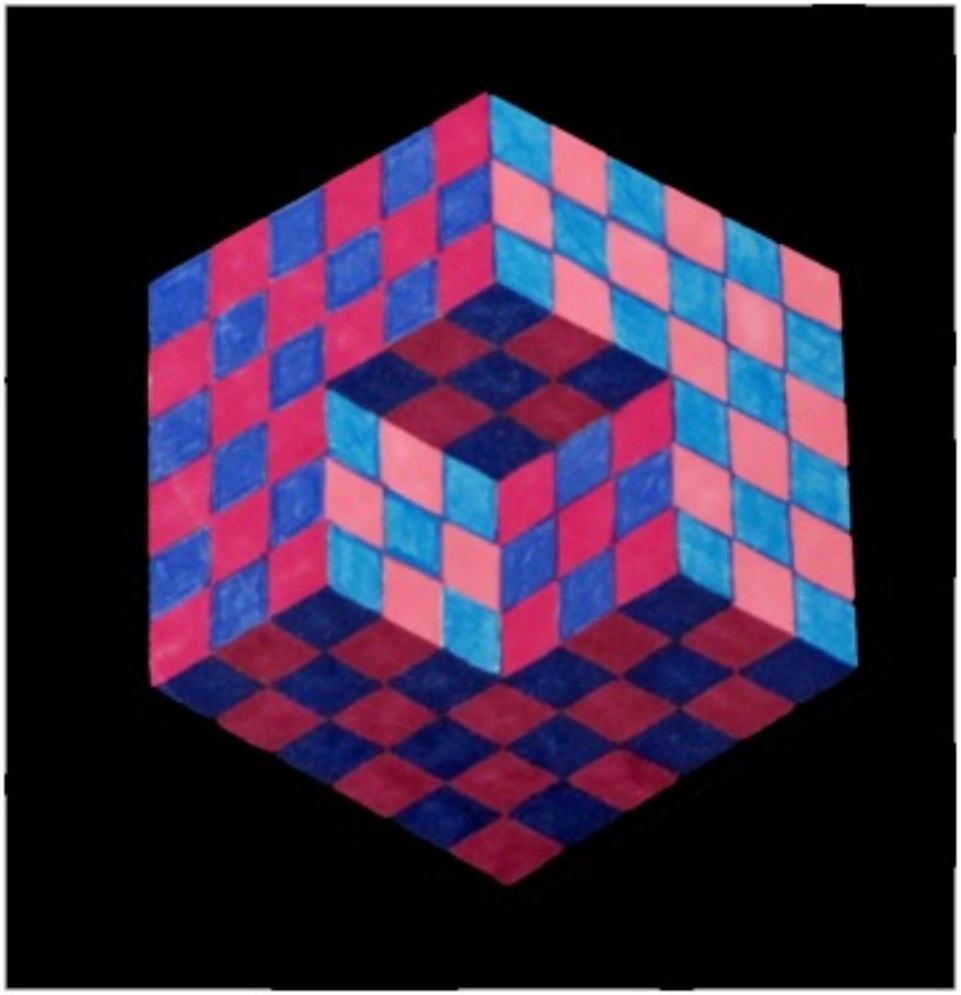
This is a photo of a real cube:

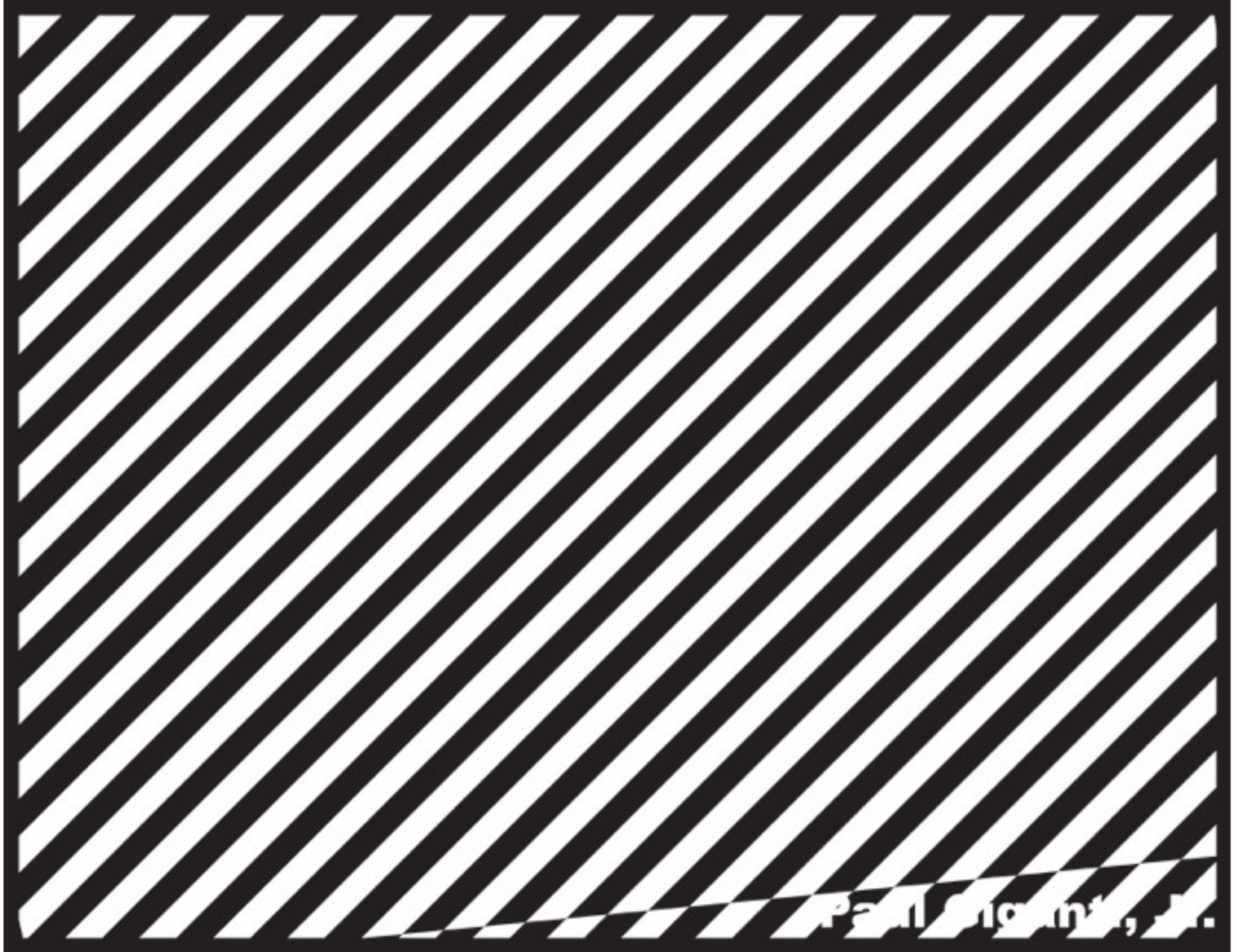


This is a drawing of a cube:

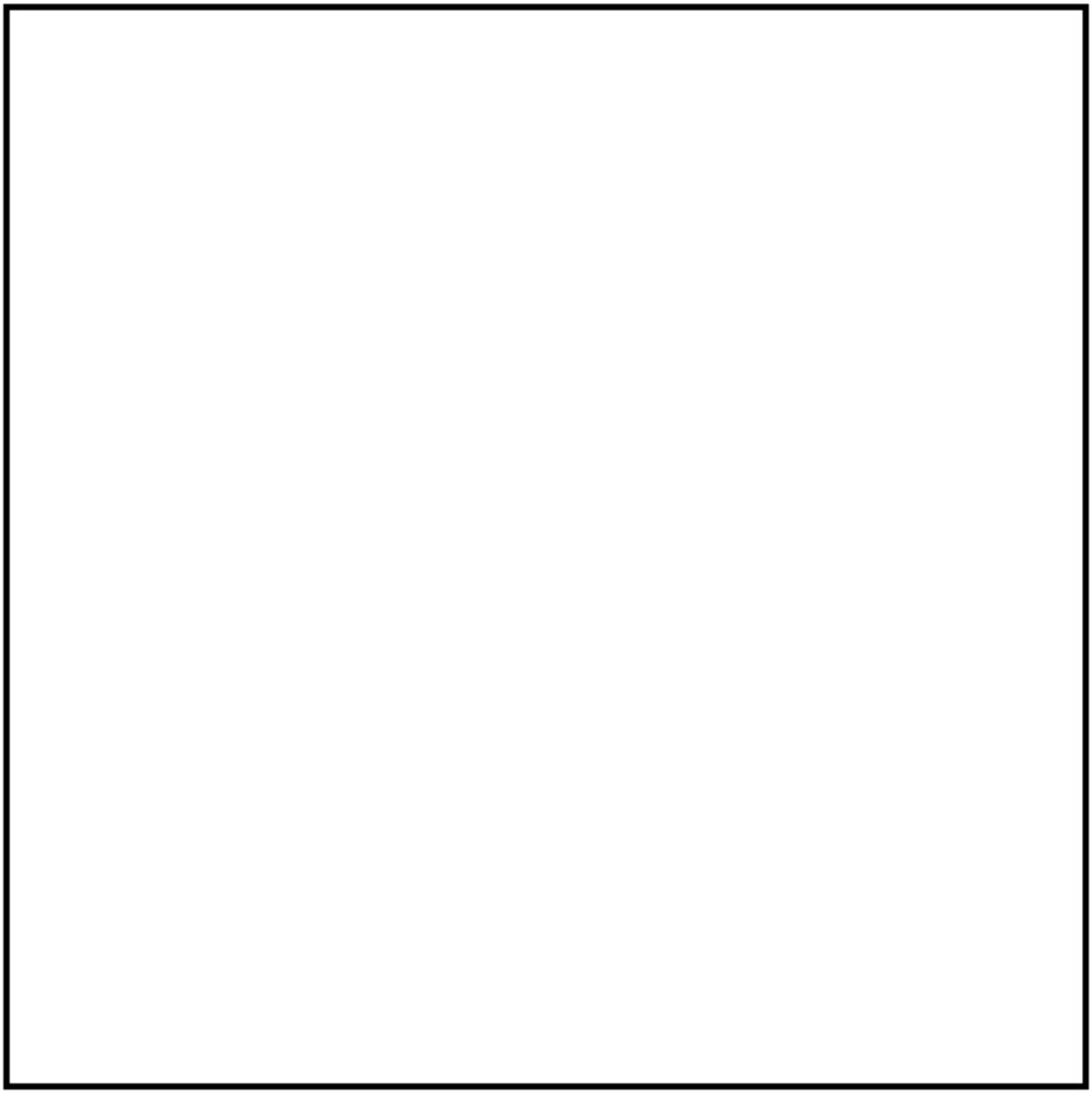


This cube is an optical illusion:

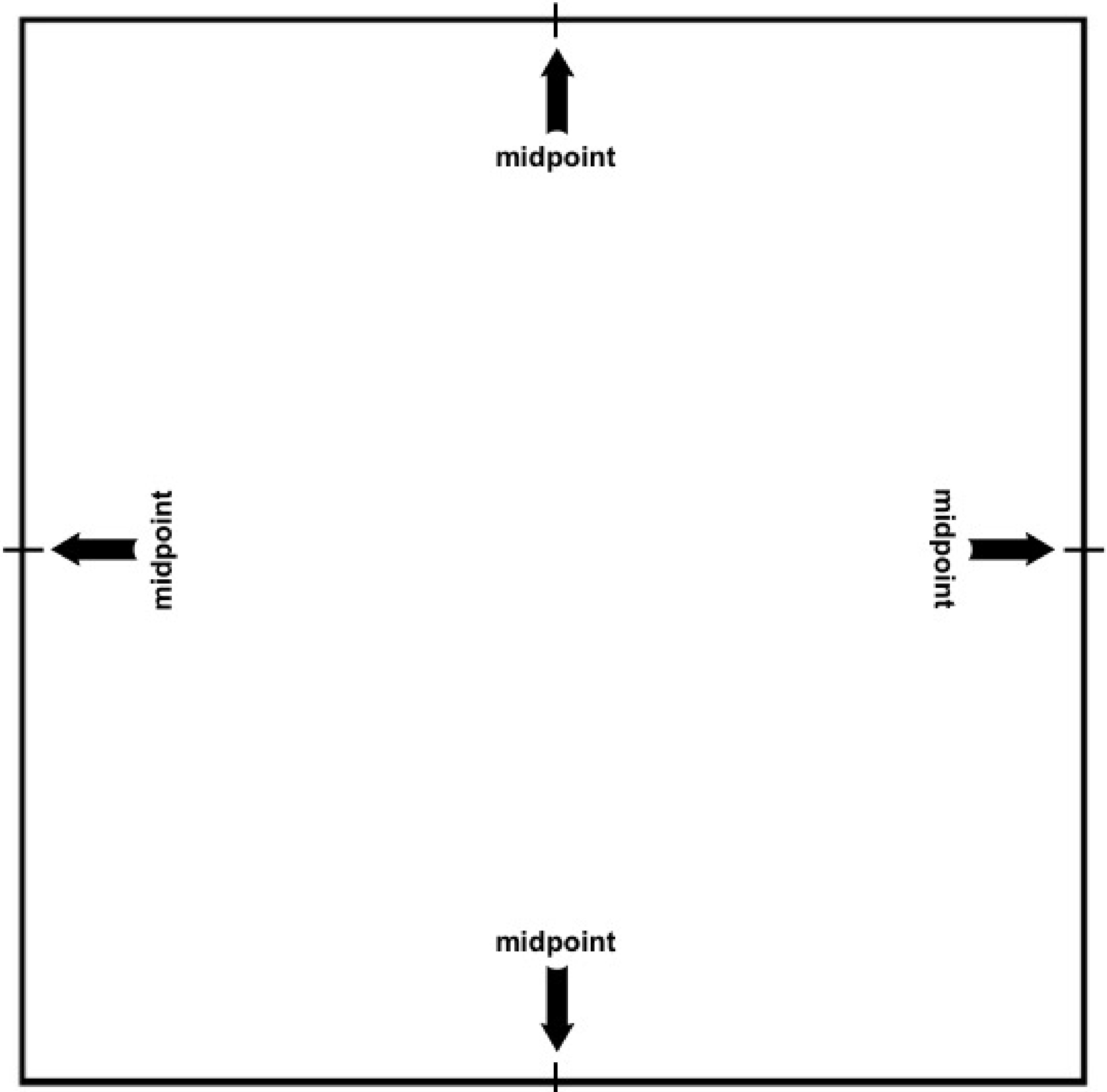




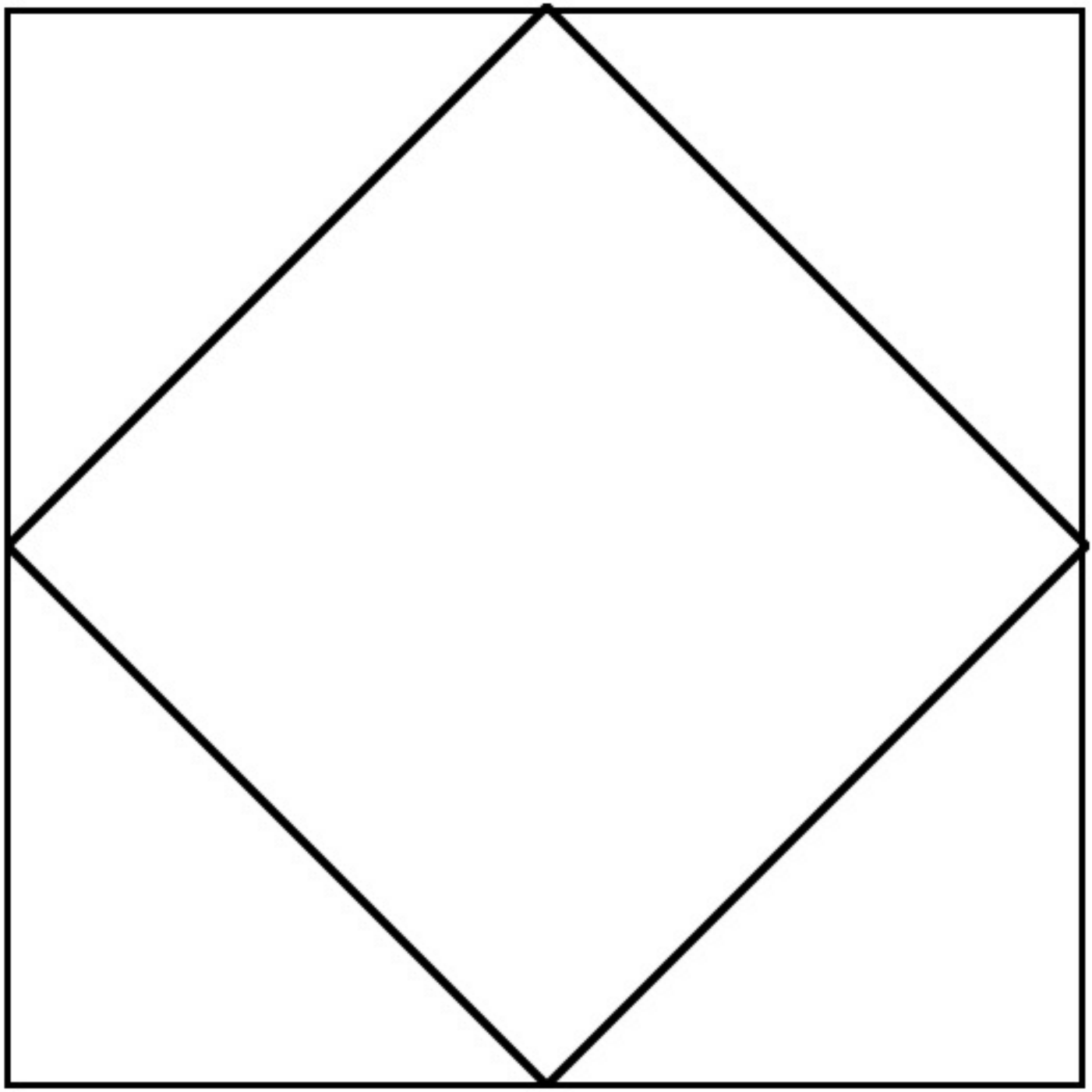
THE MAGIC OF SQUARES



Paul Giganti, Jr.



Paul Giganti, Jr.



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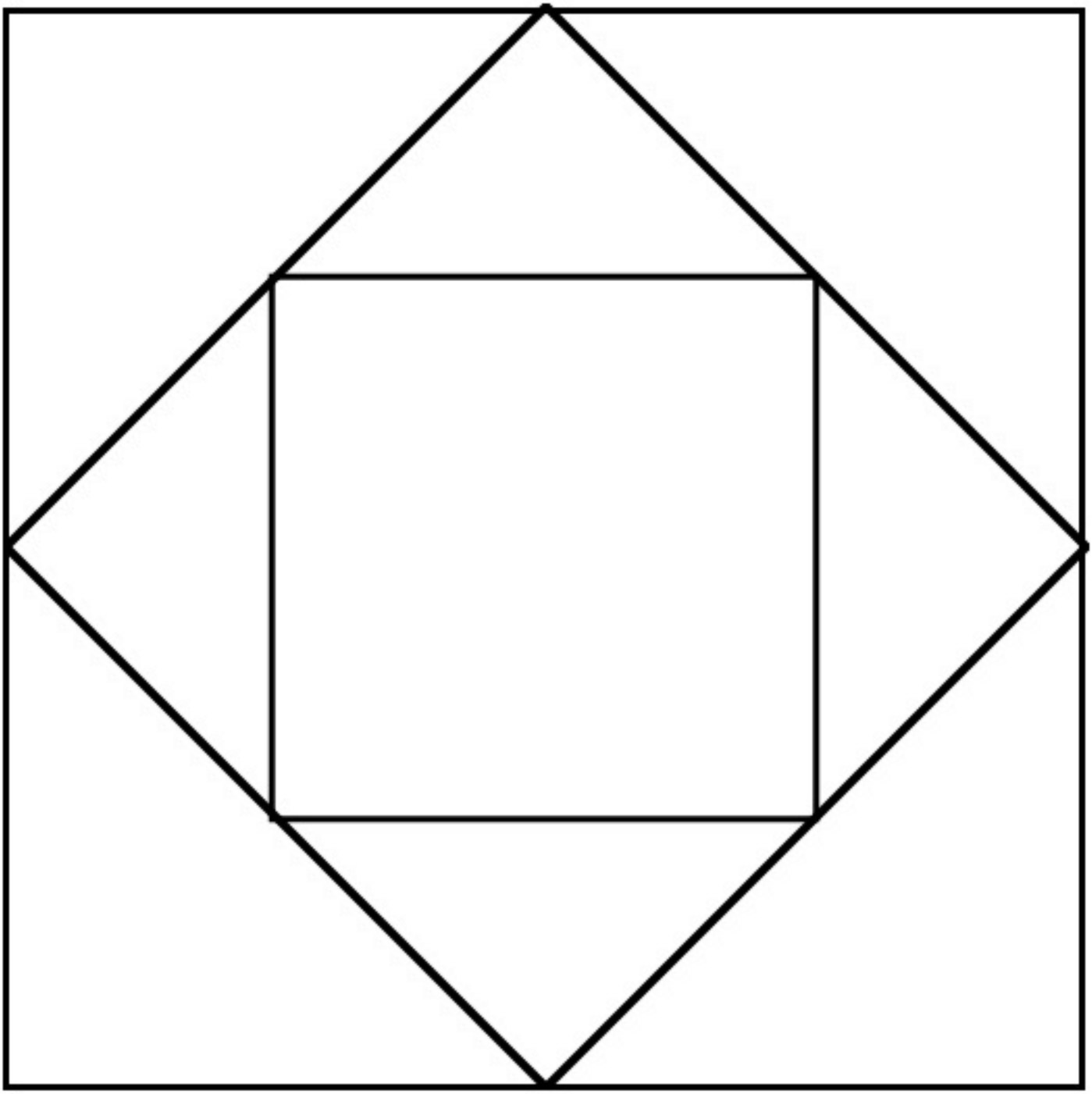

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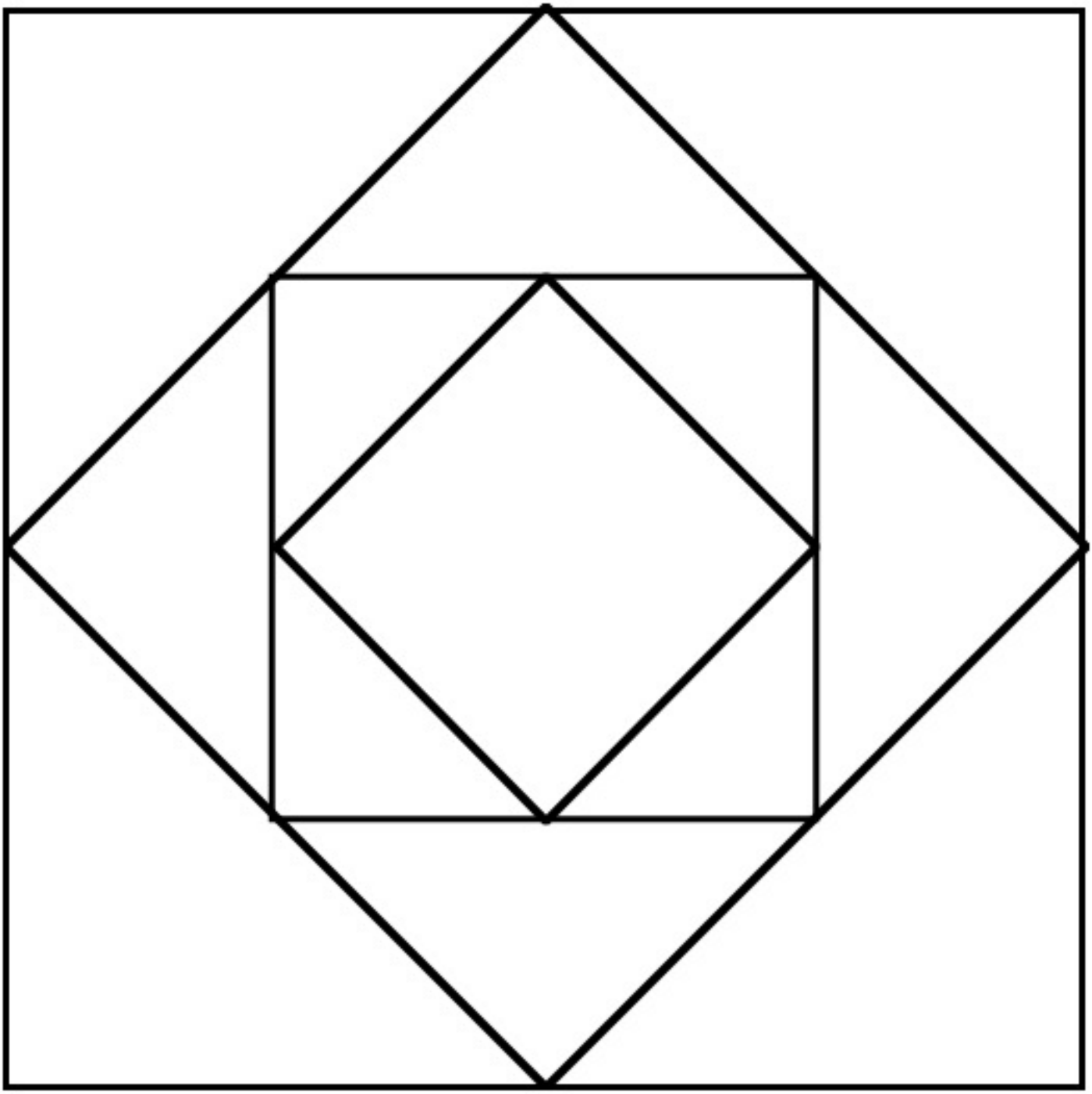

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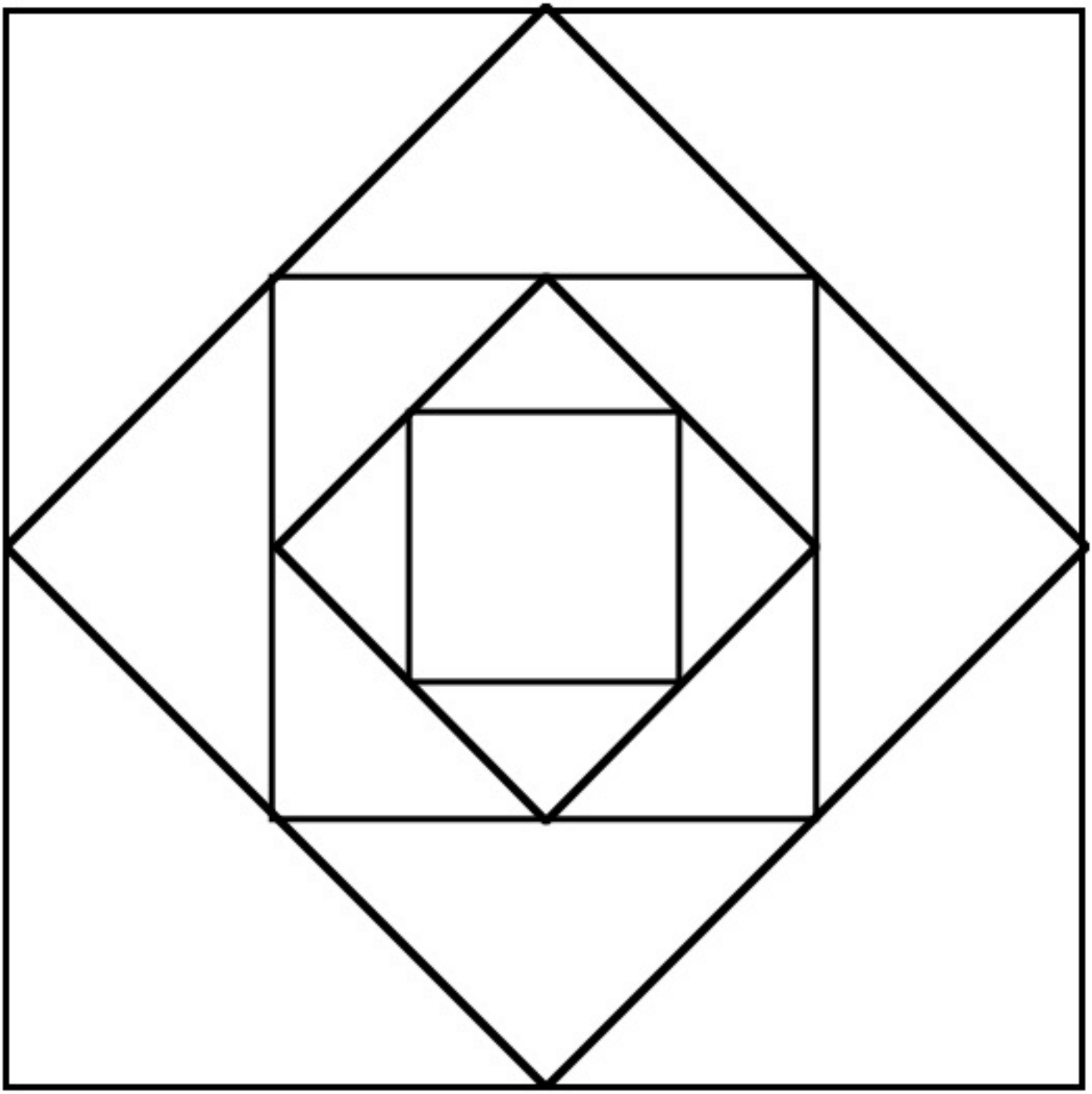

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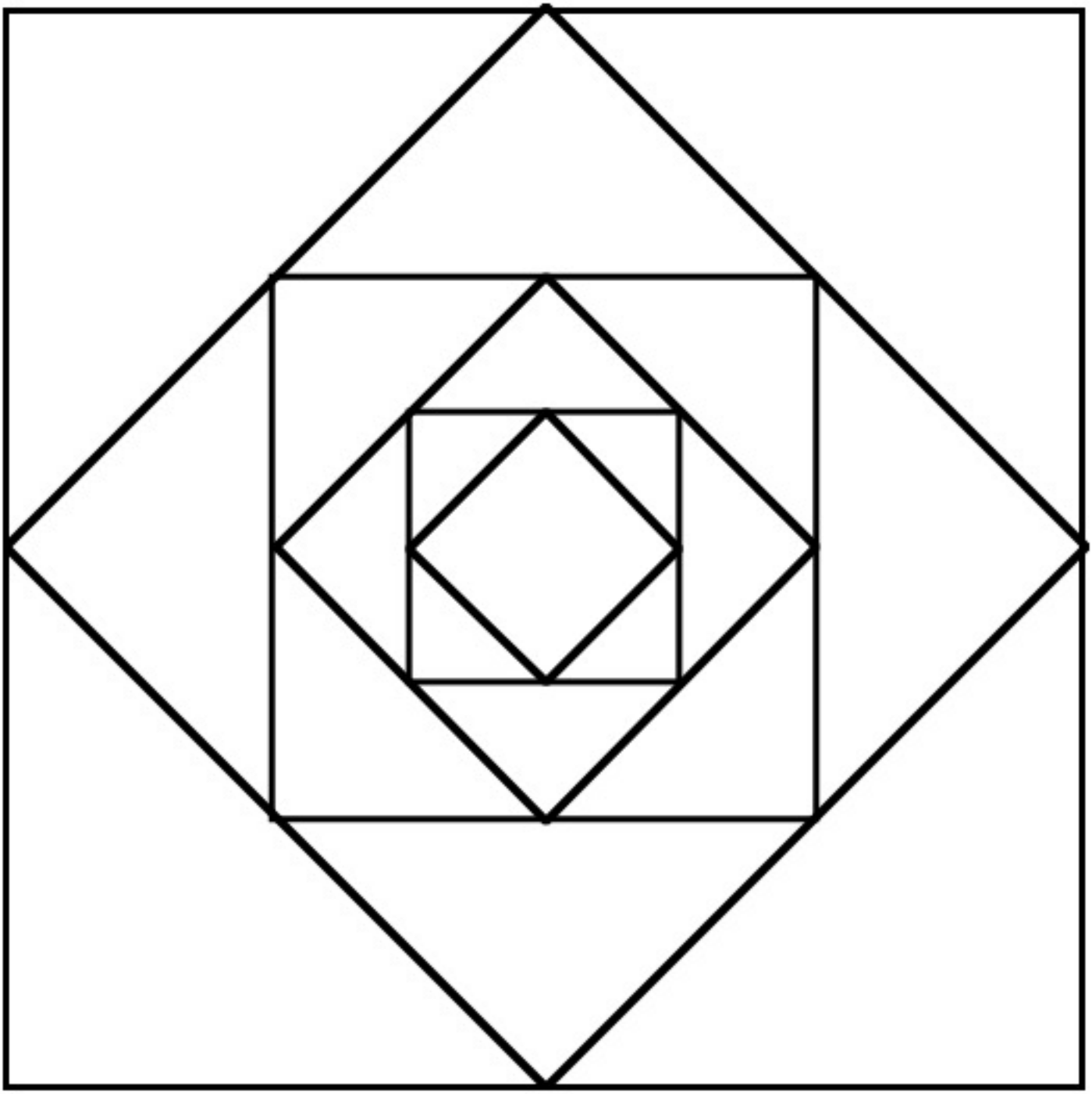

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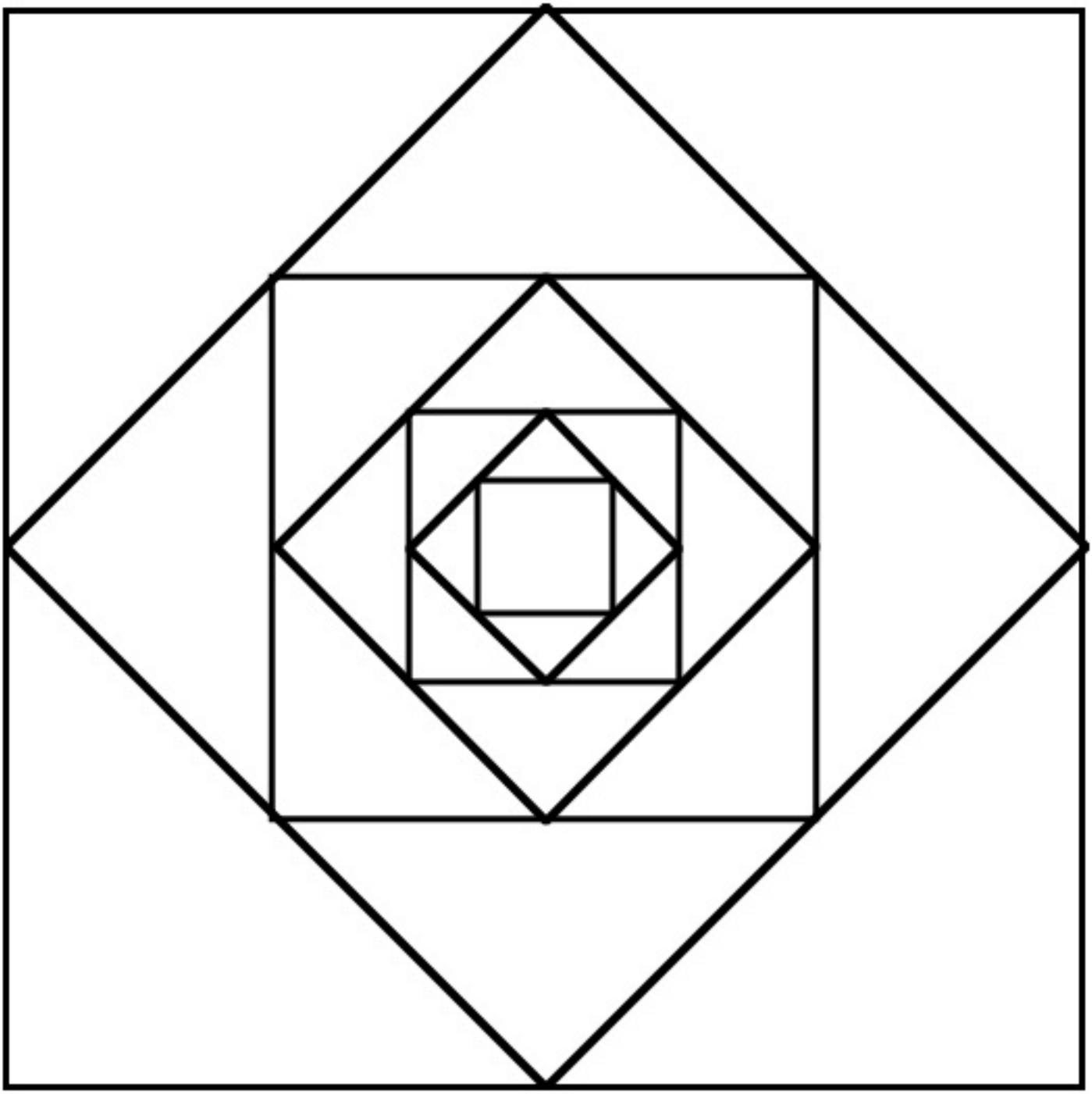

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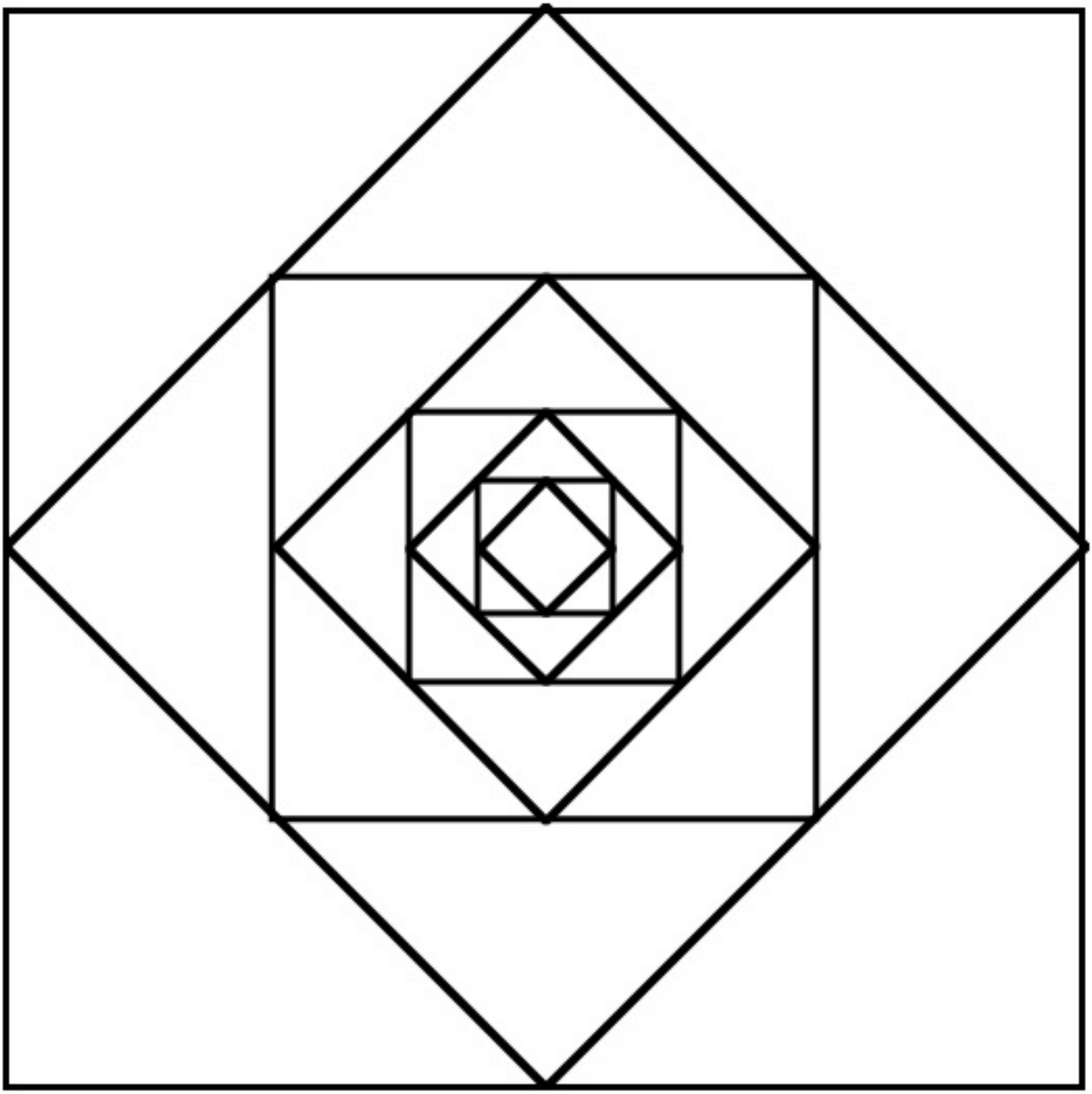

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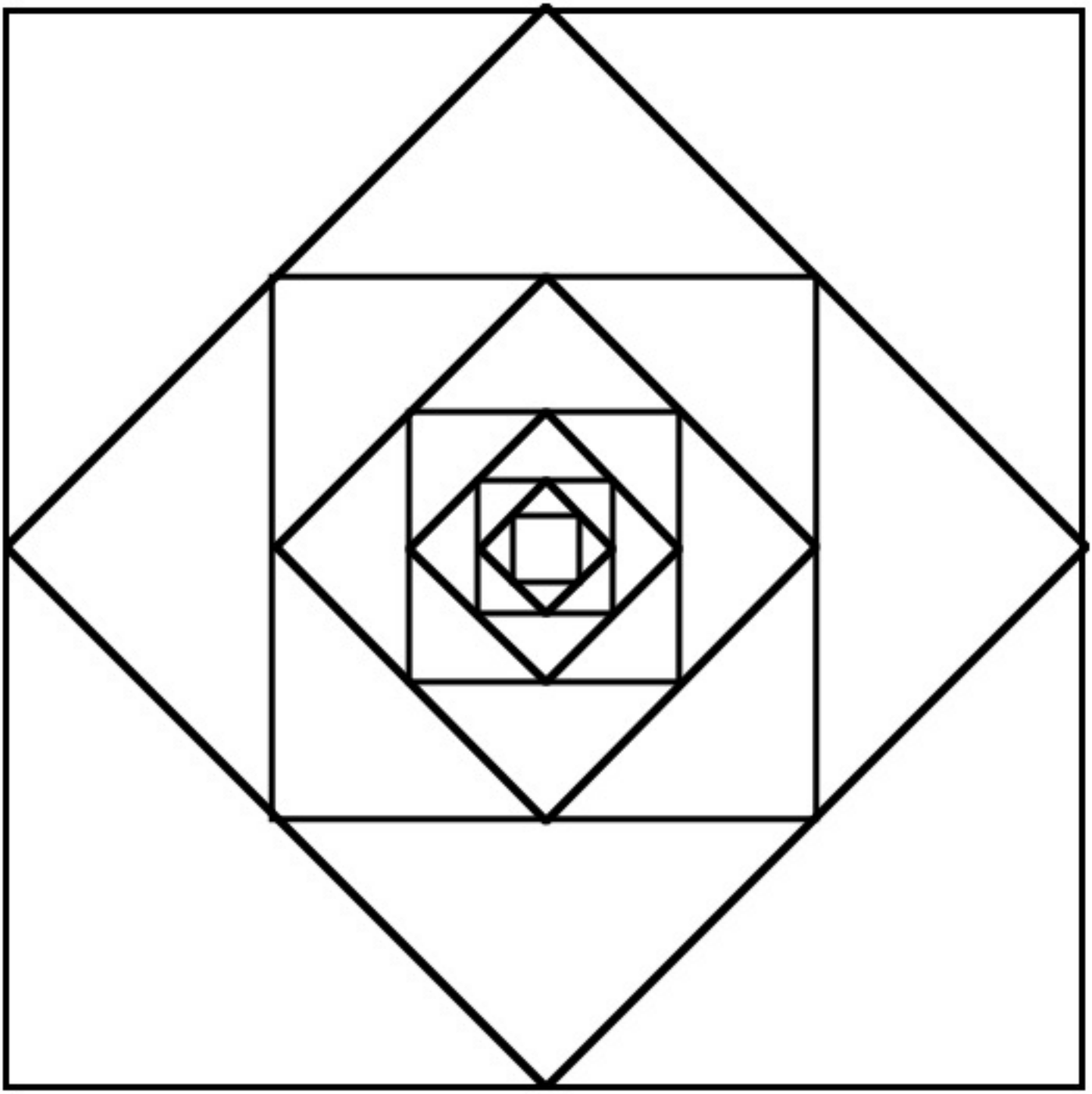

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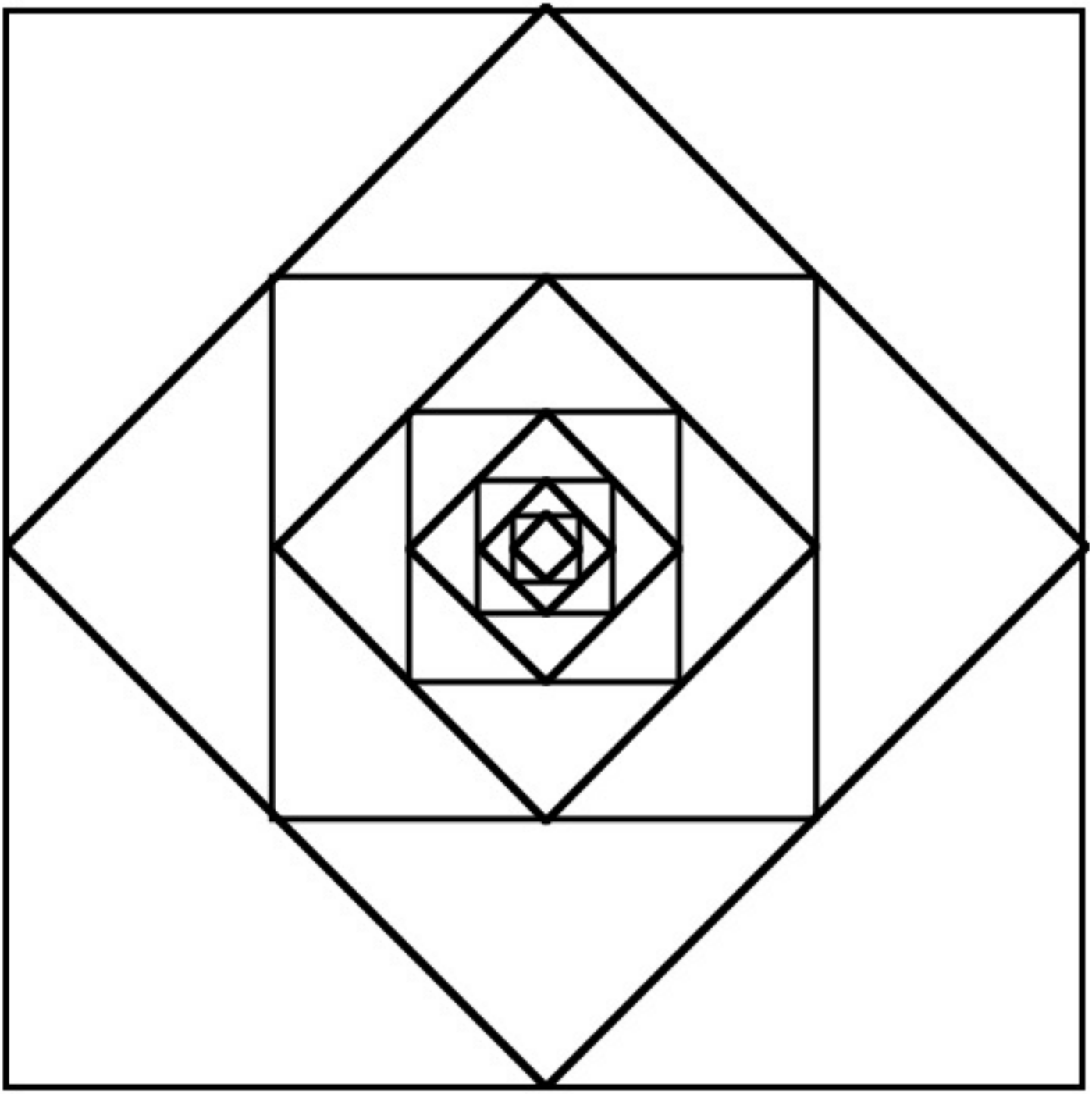

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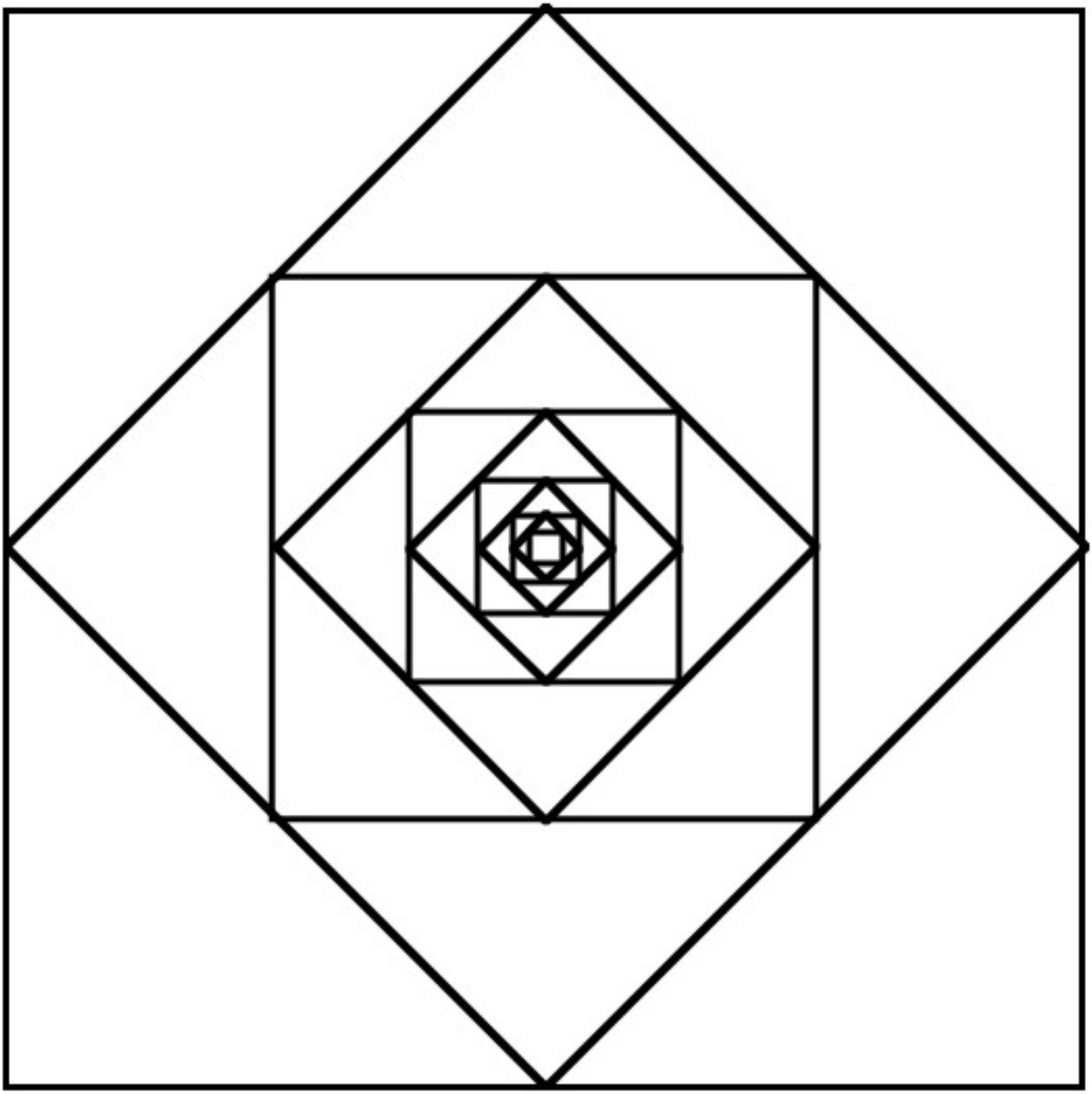

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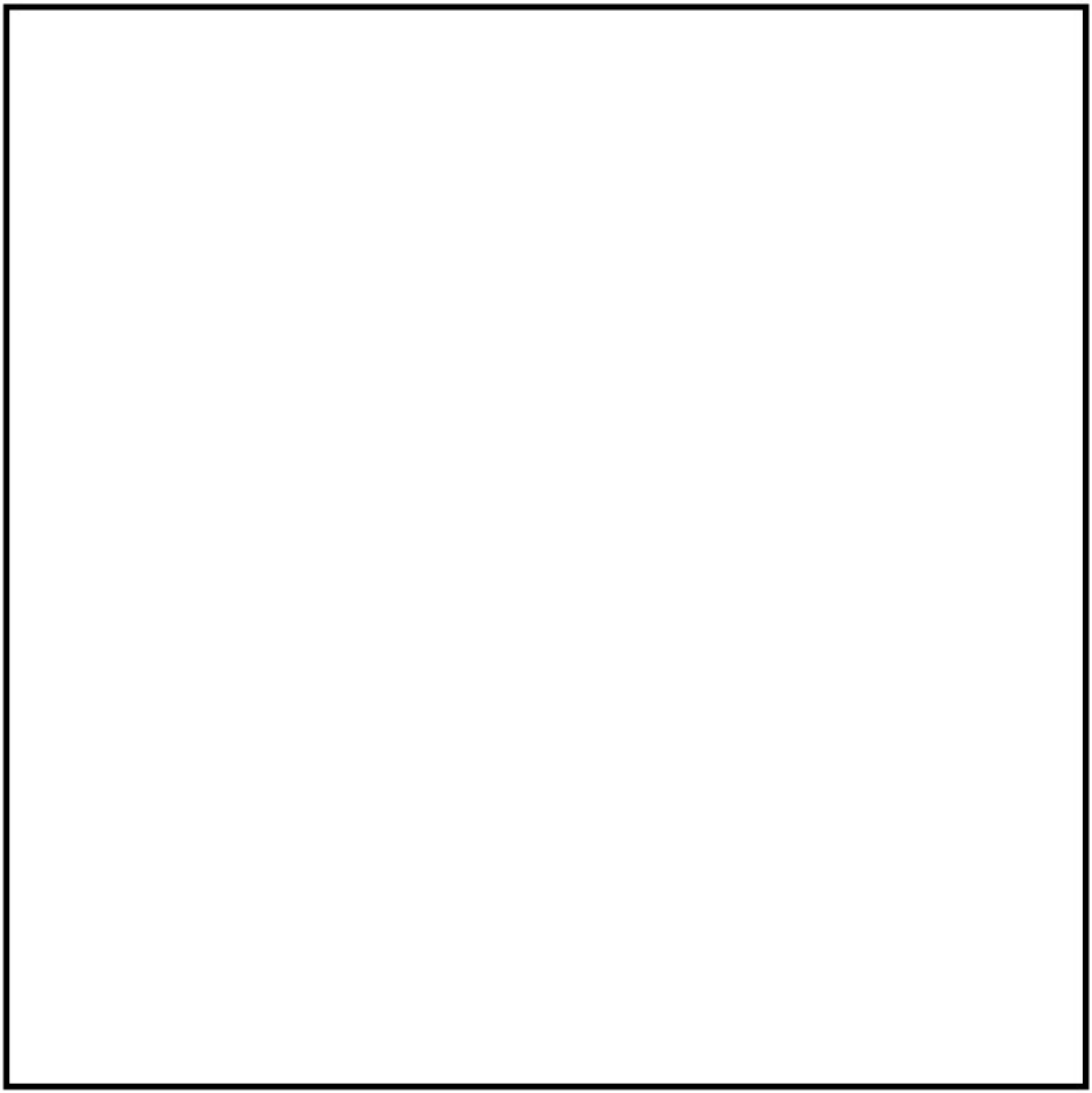

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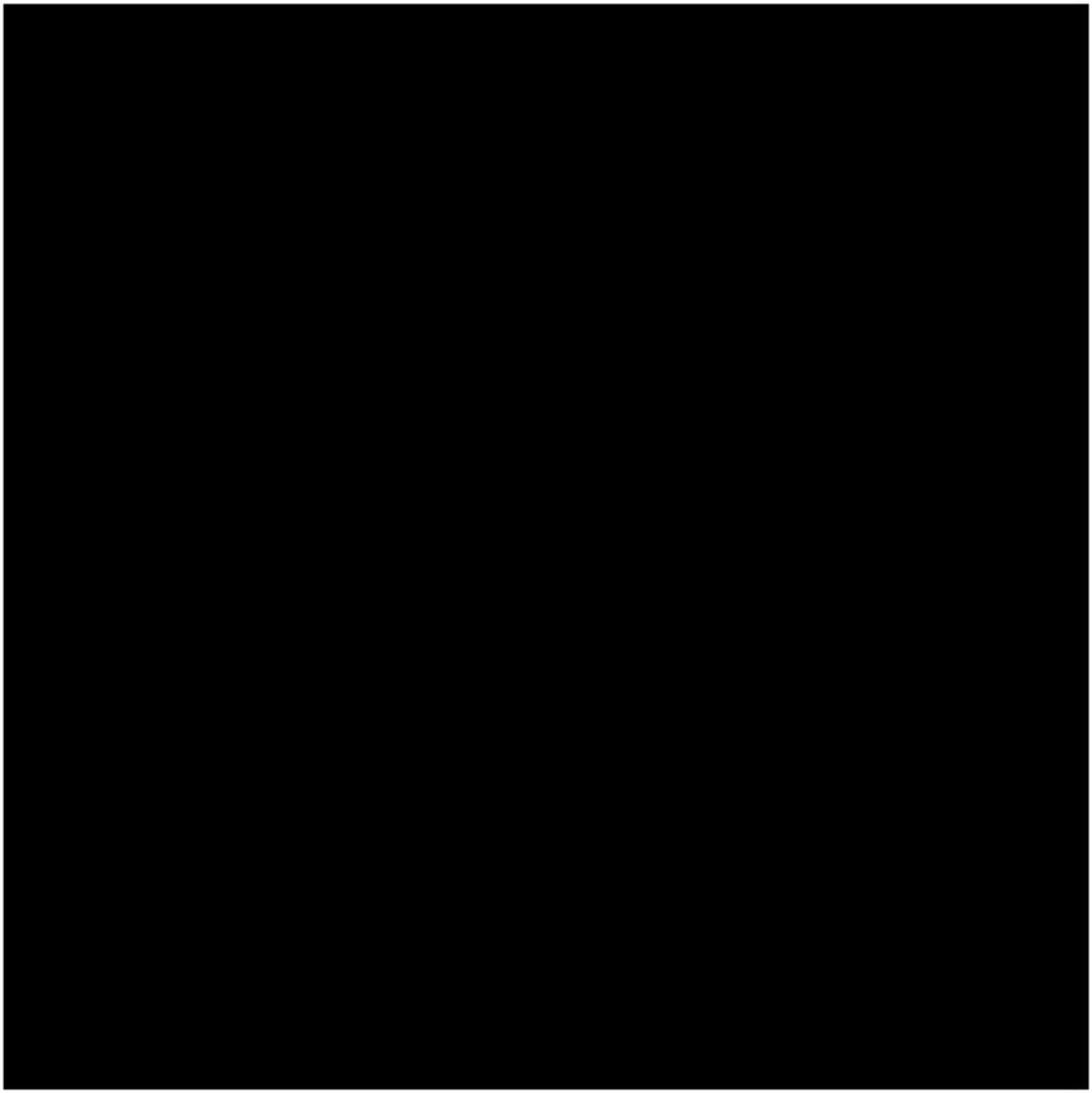

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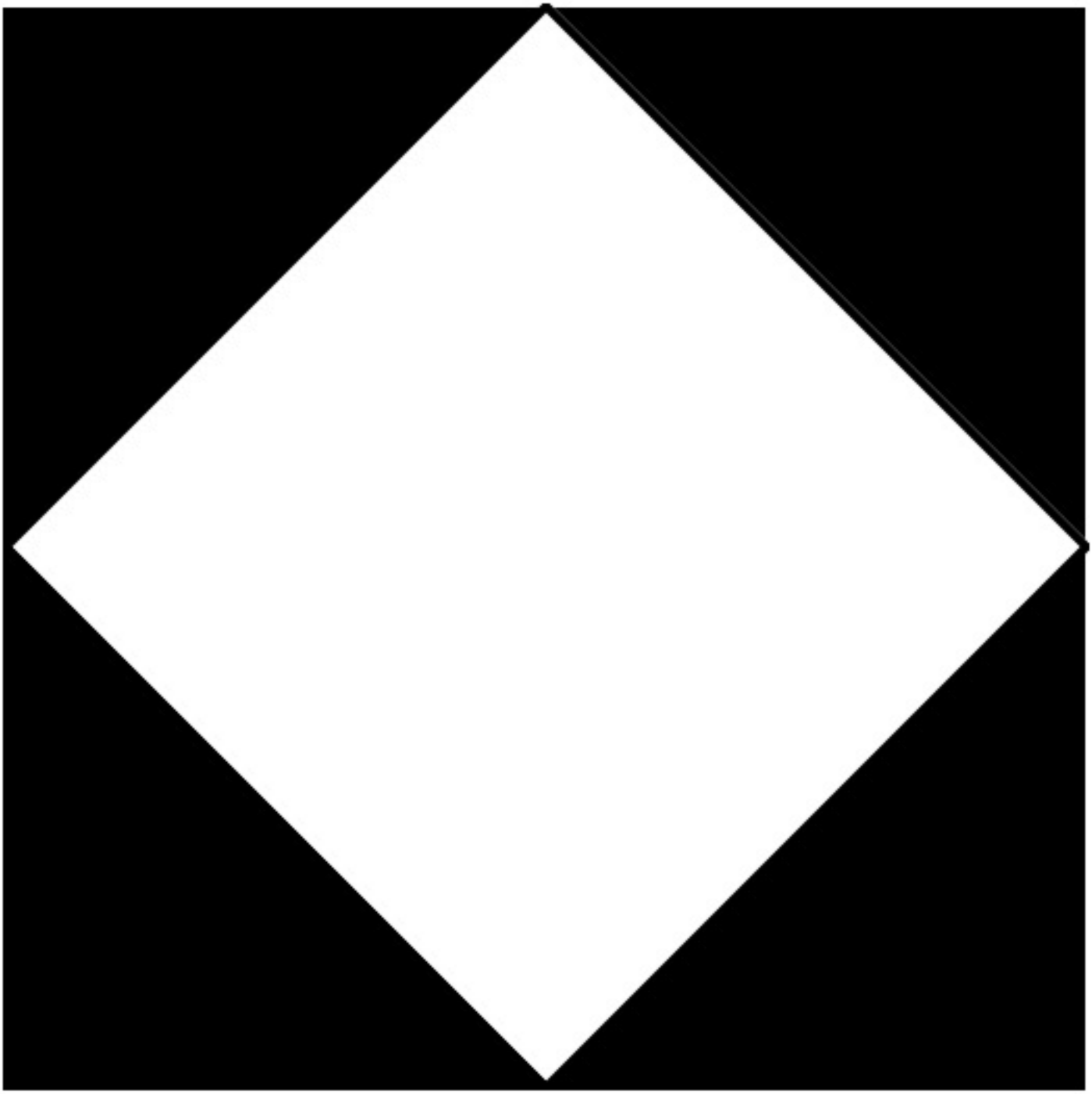

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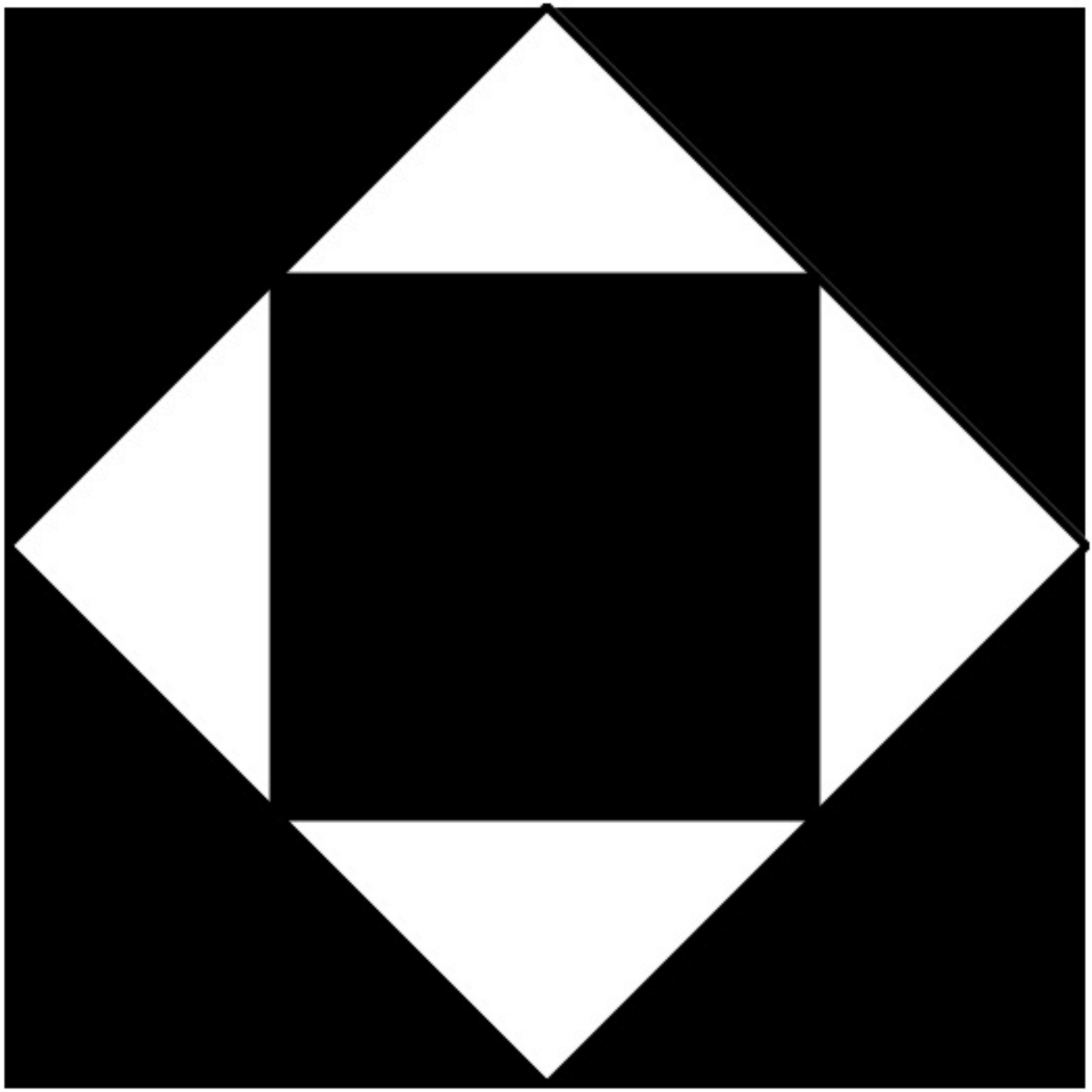

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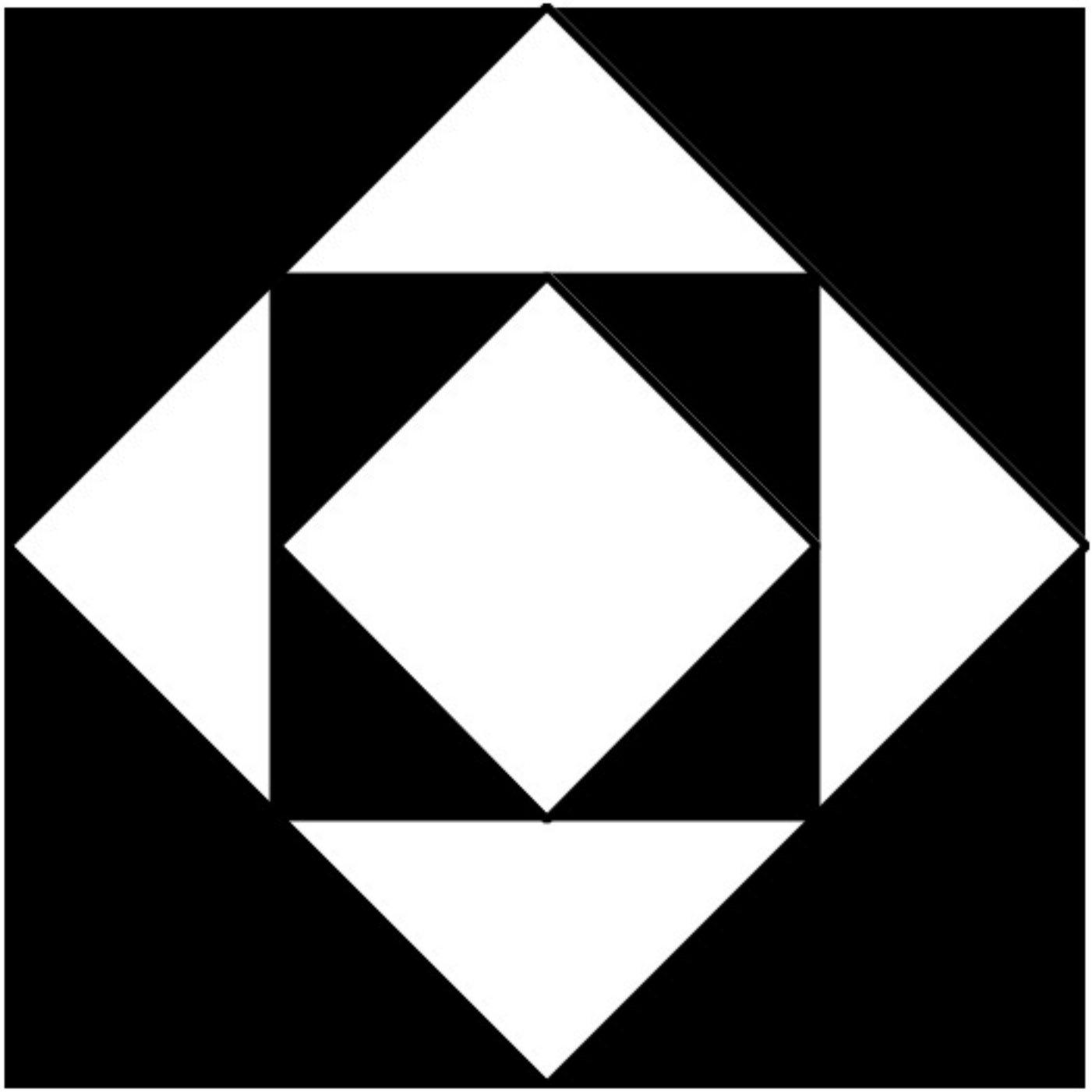

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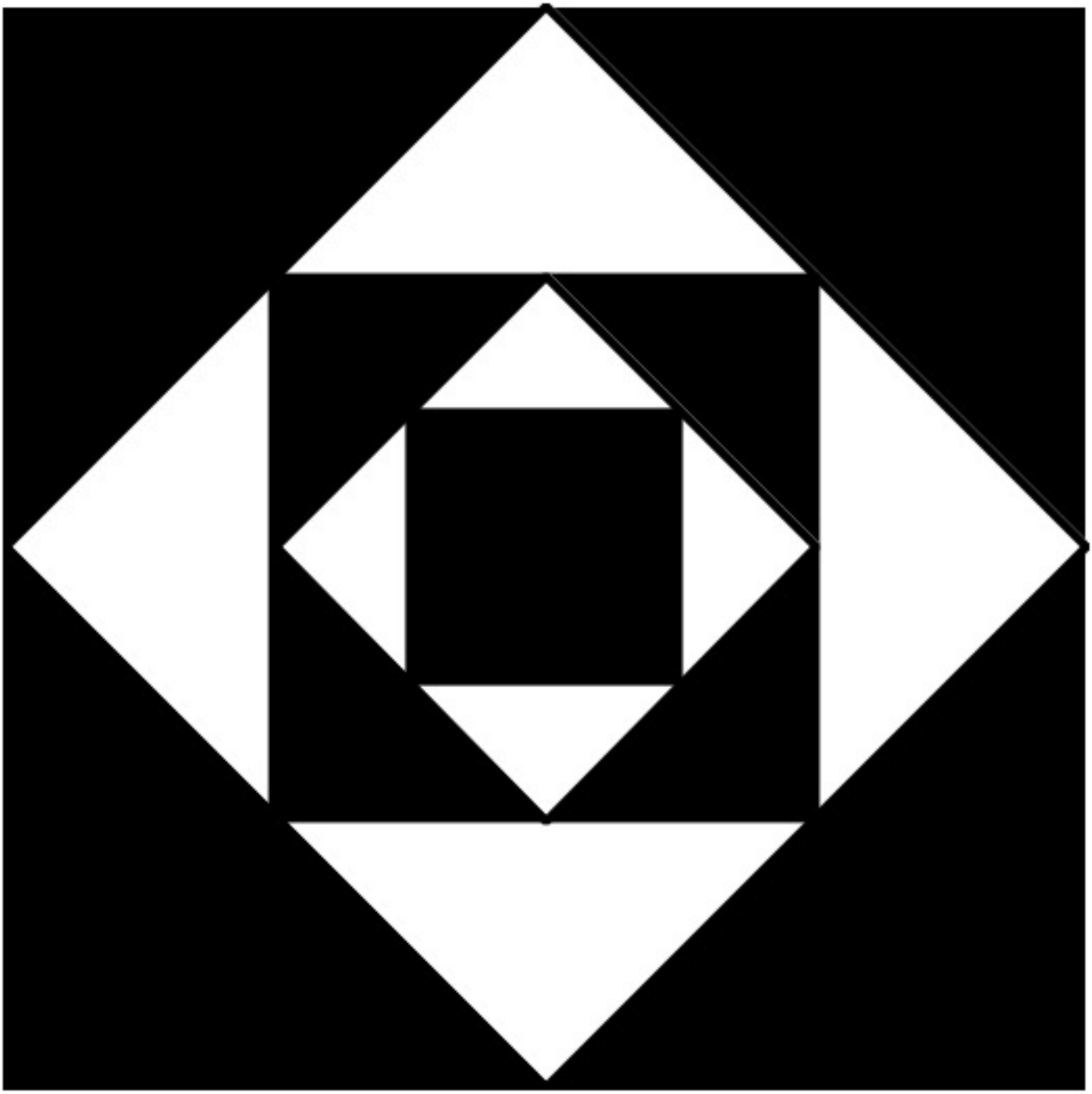

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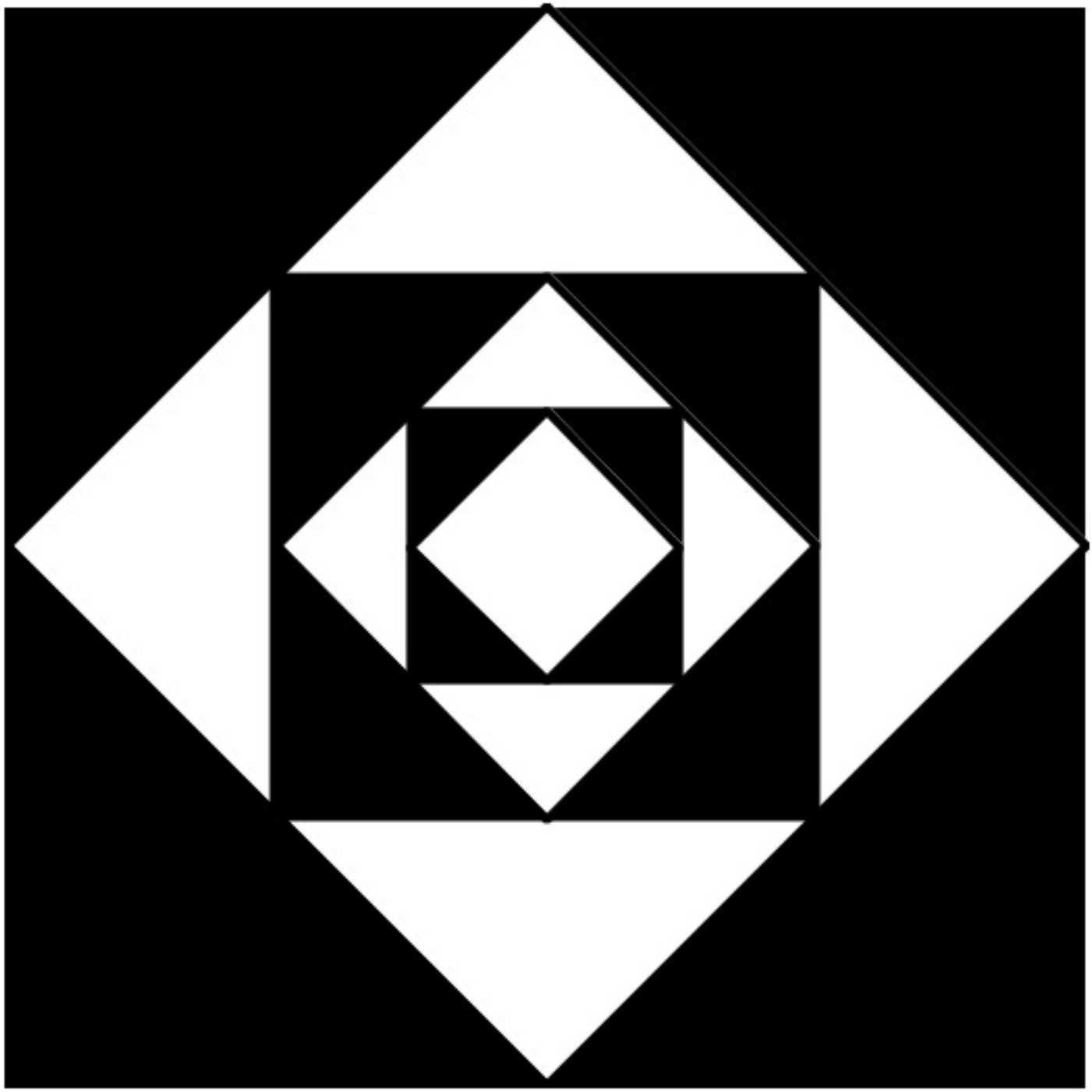

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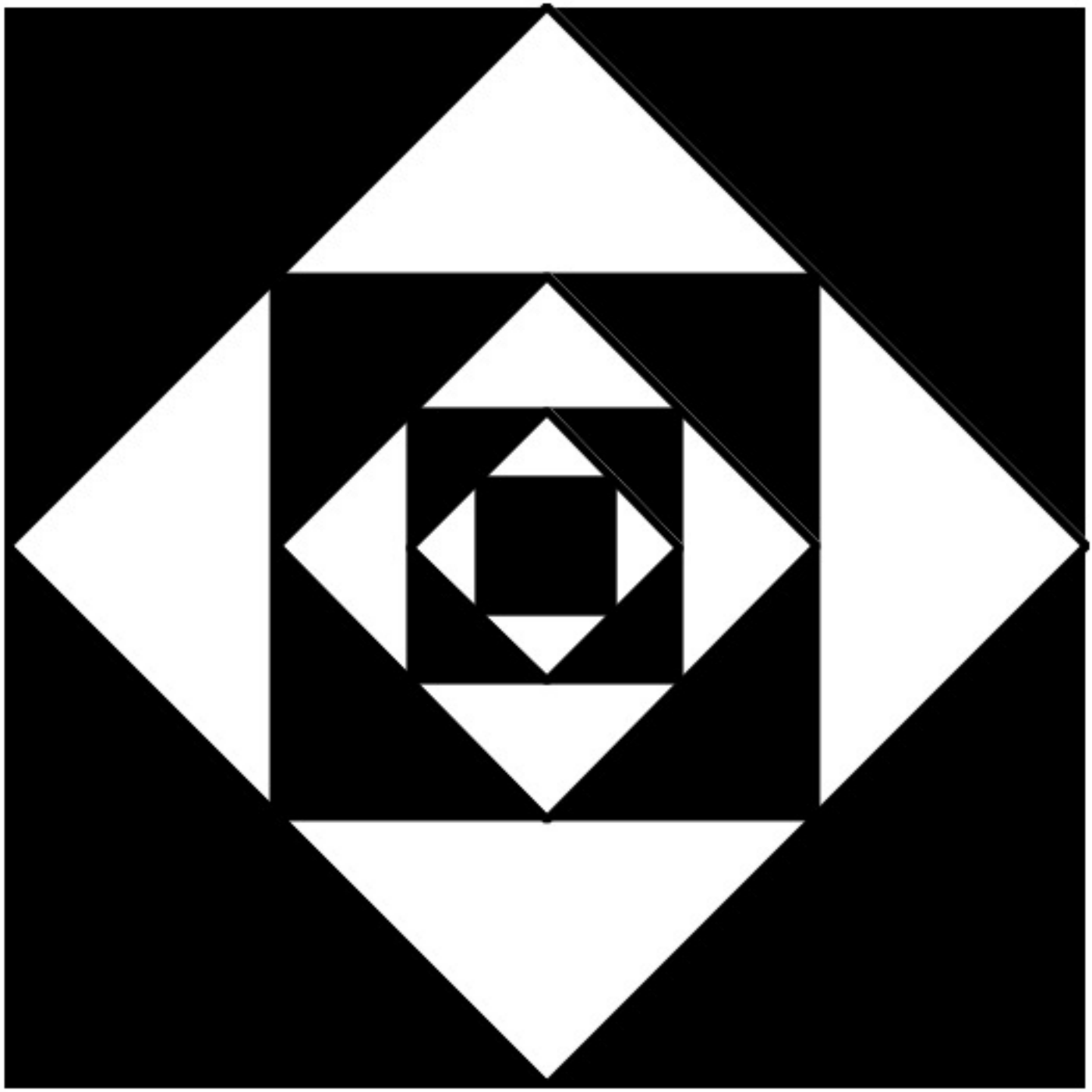

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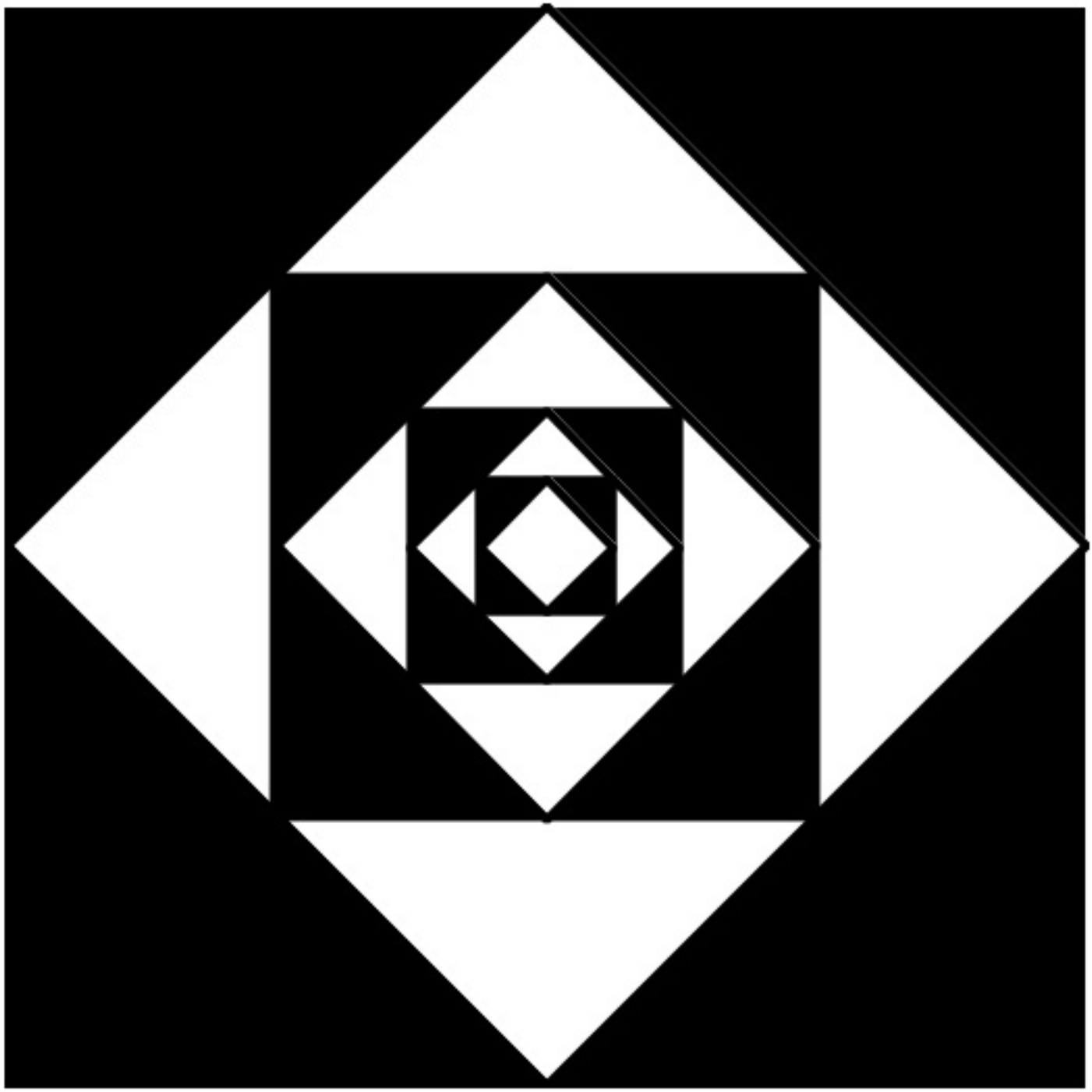

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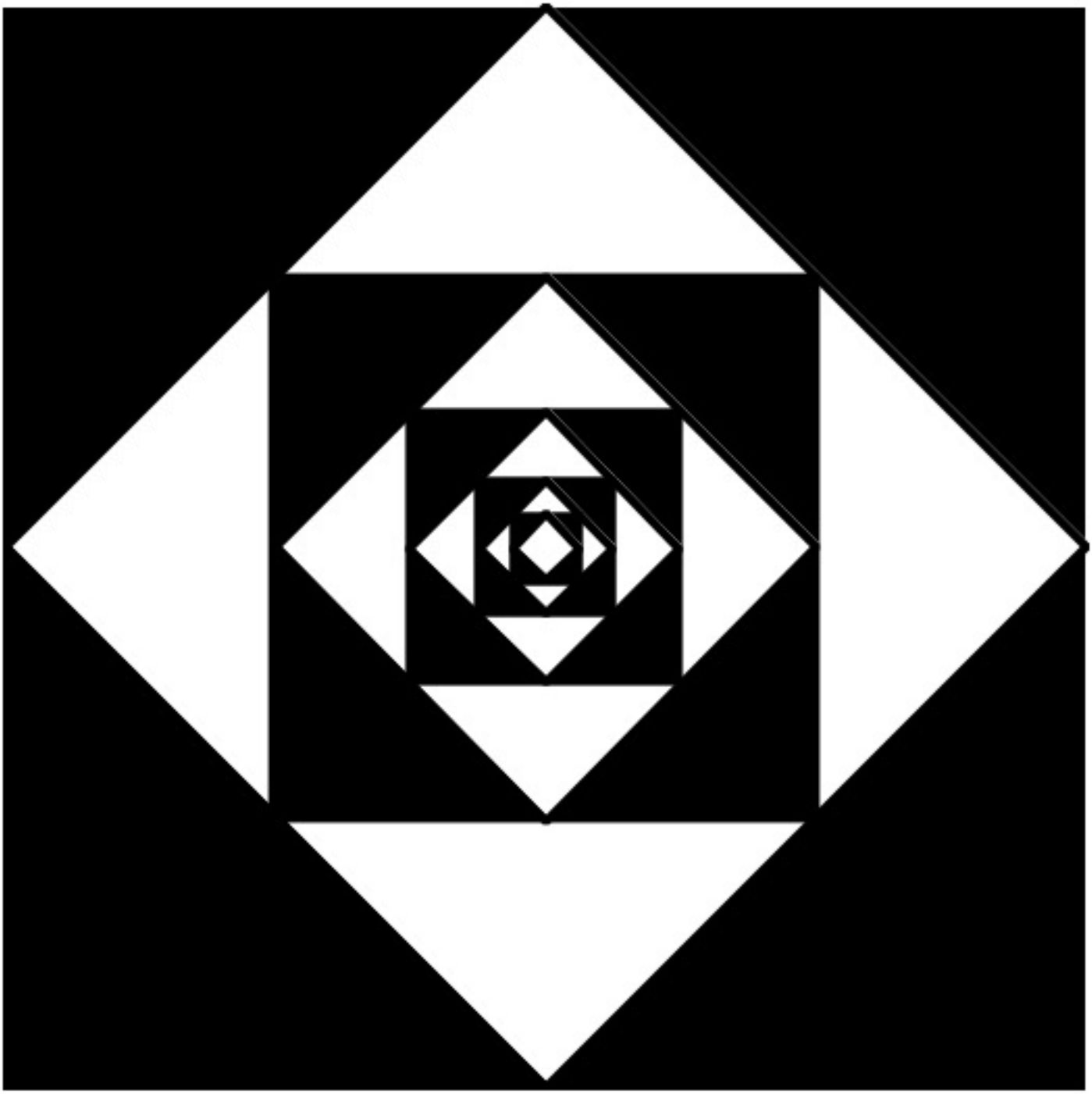

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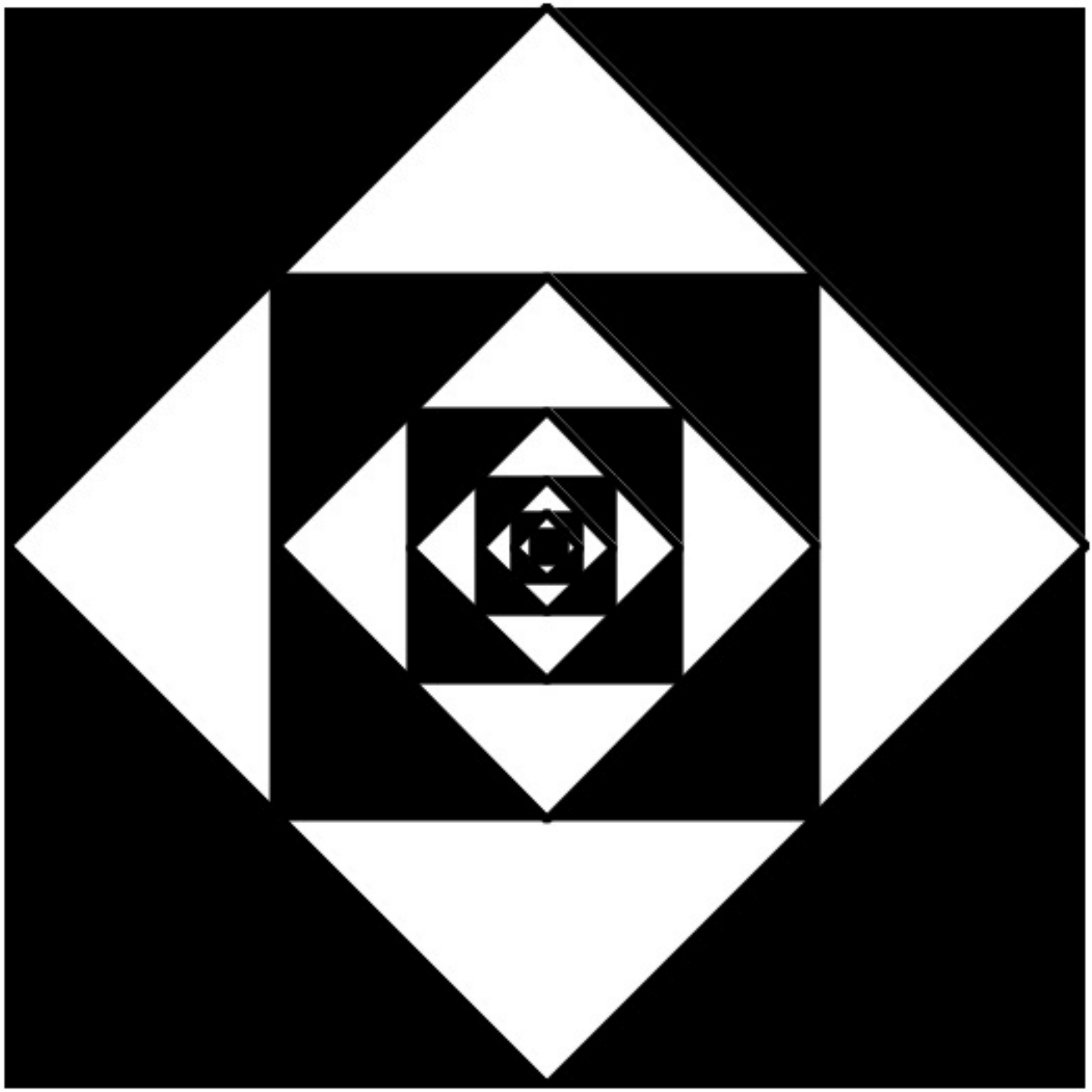

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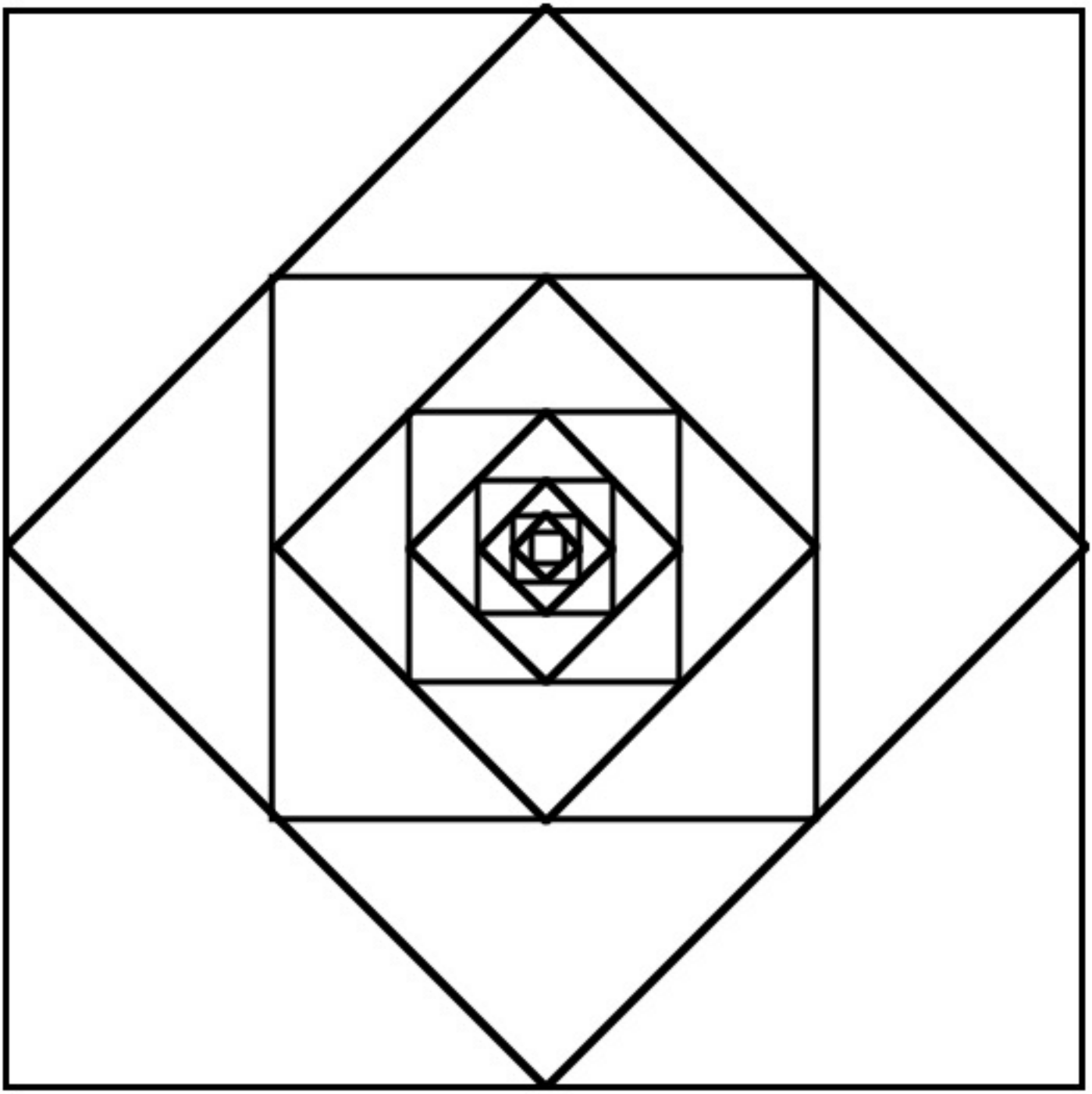

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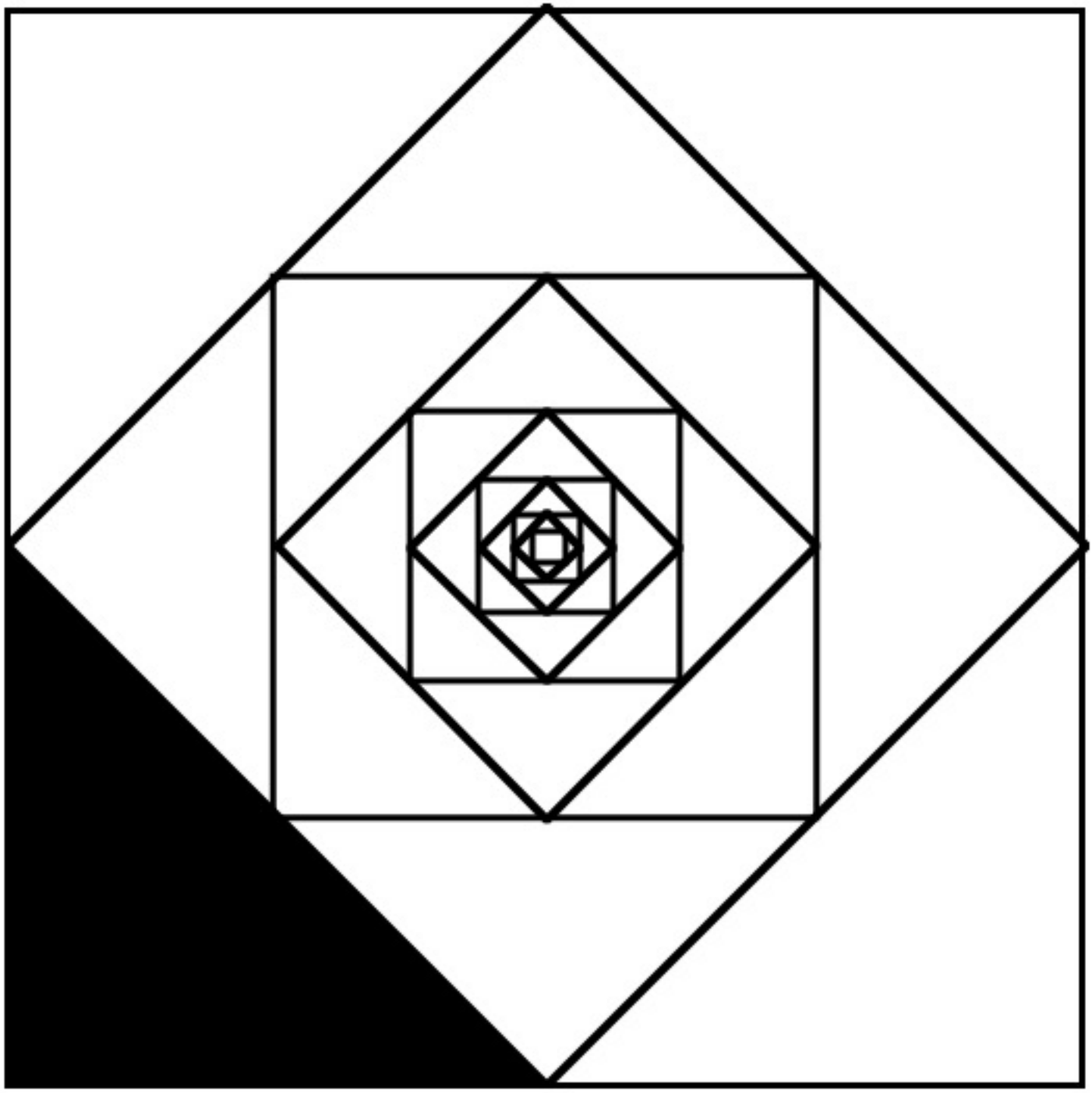

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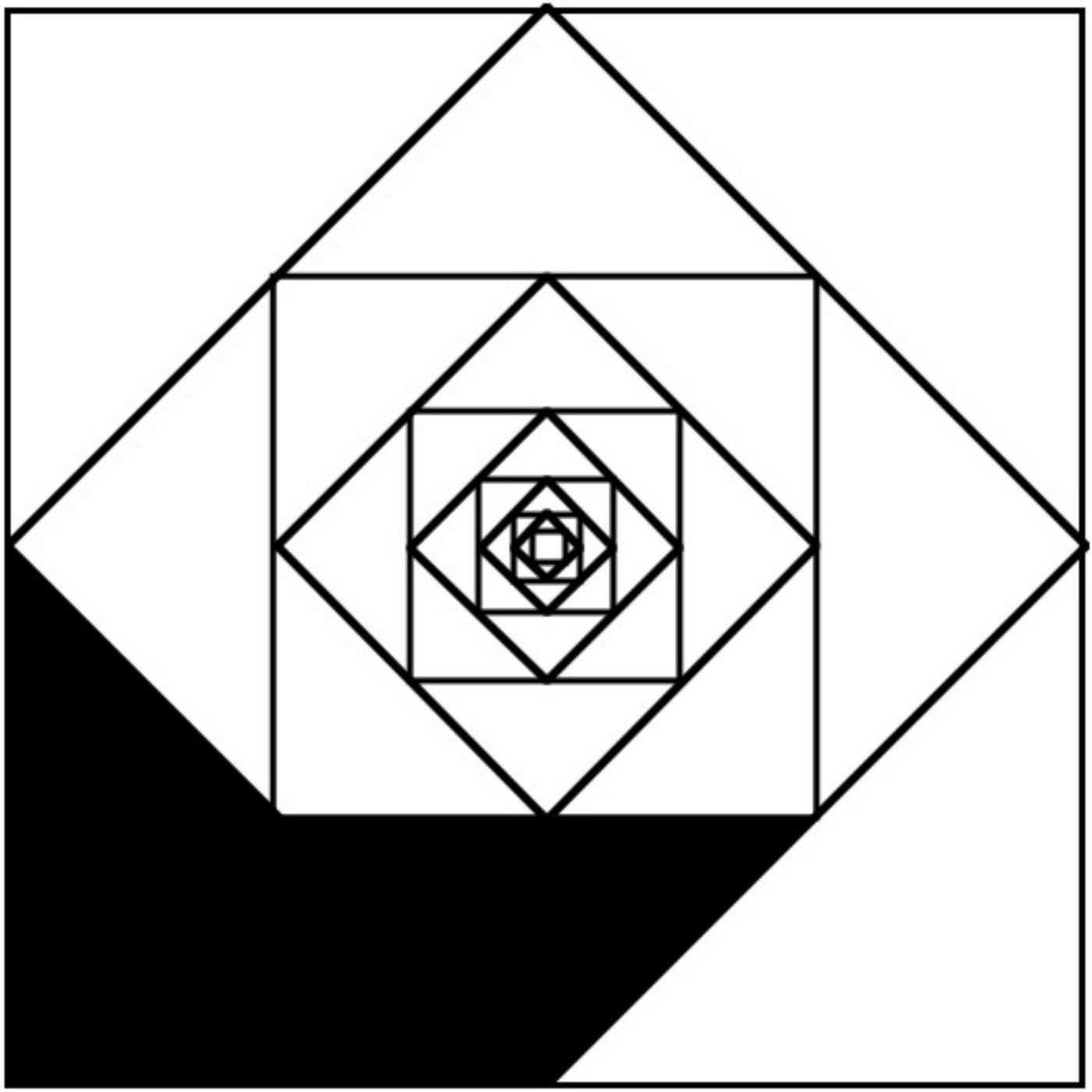

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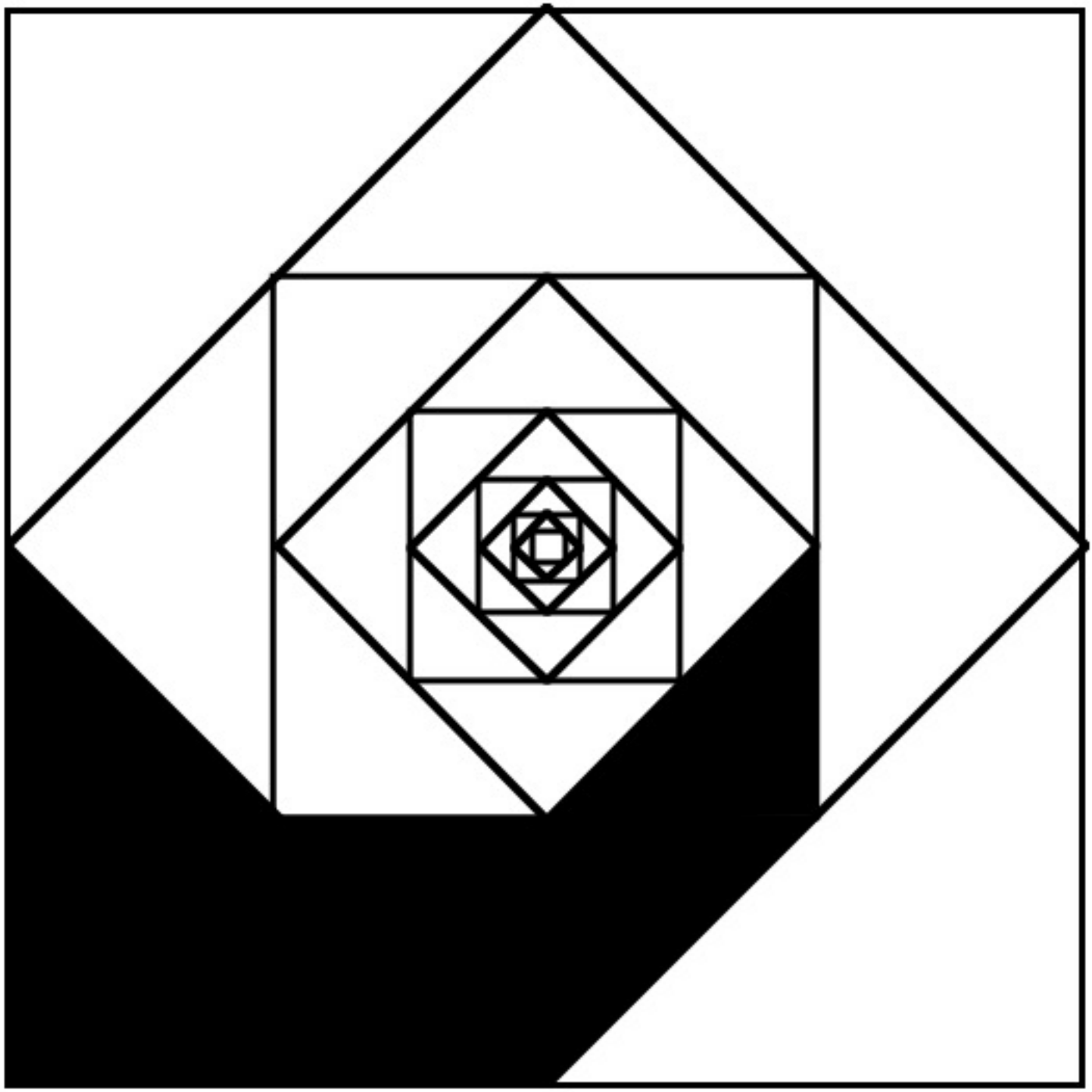

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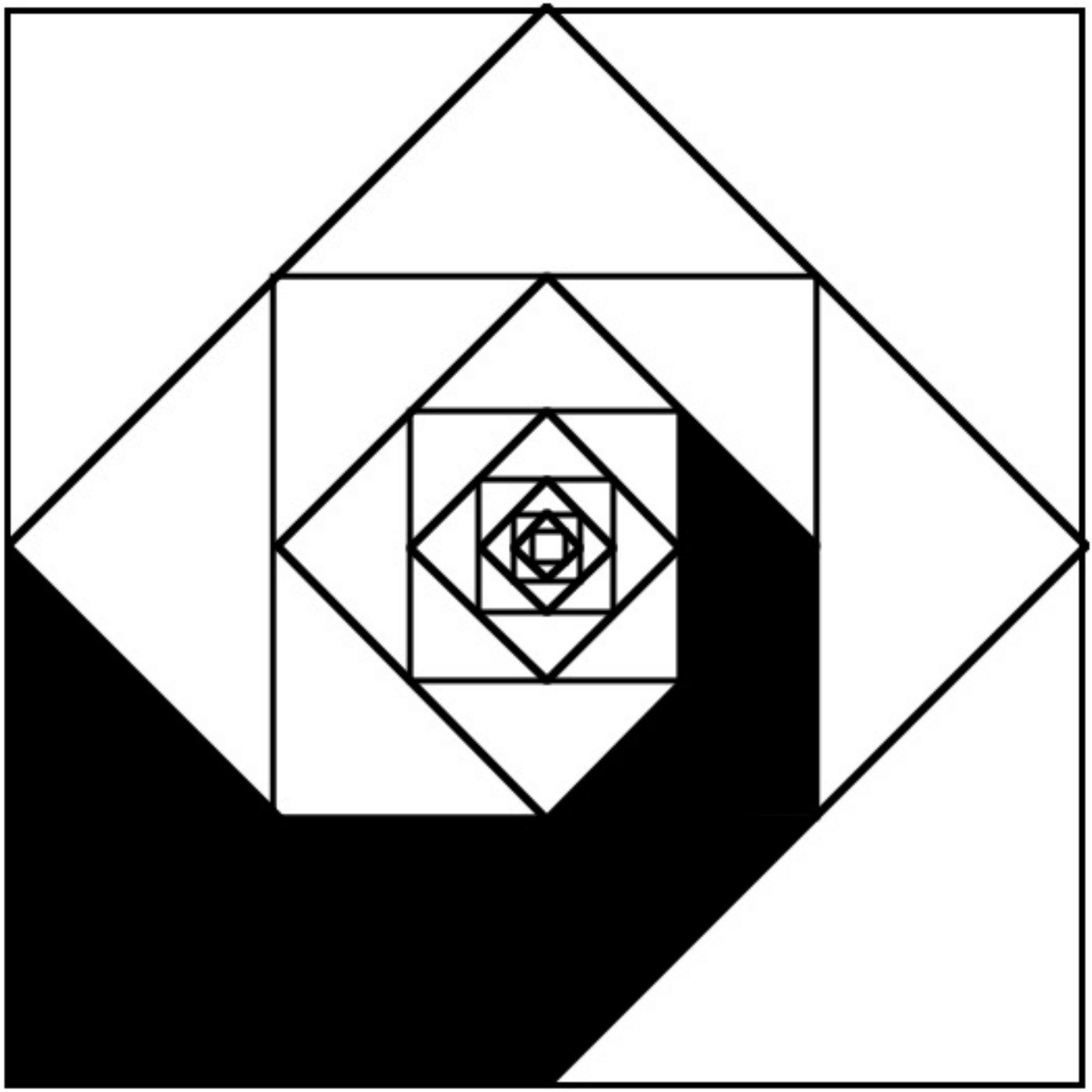

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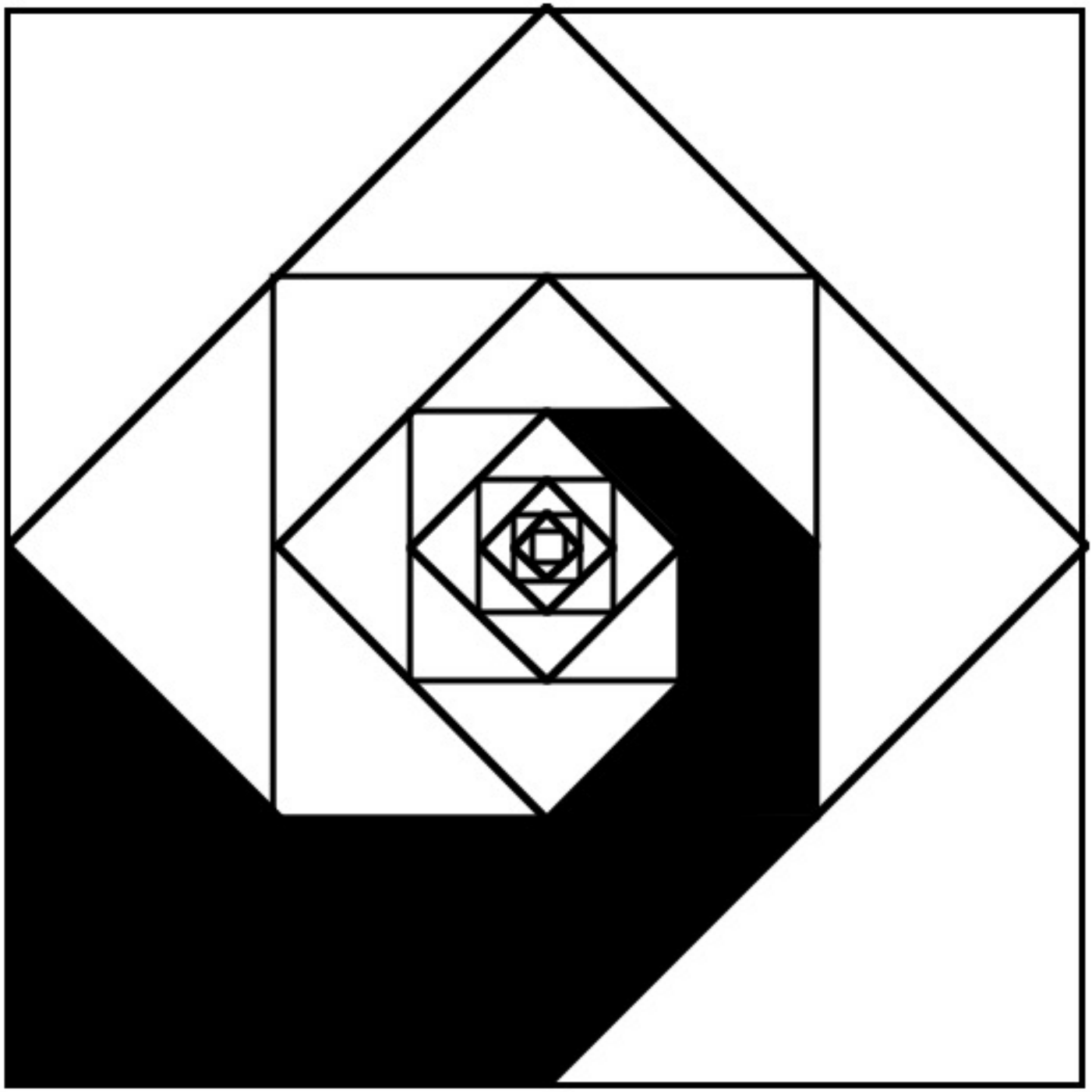

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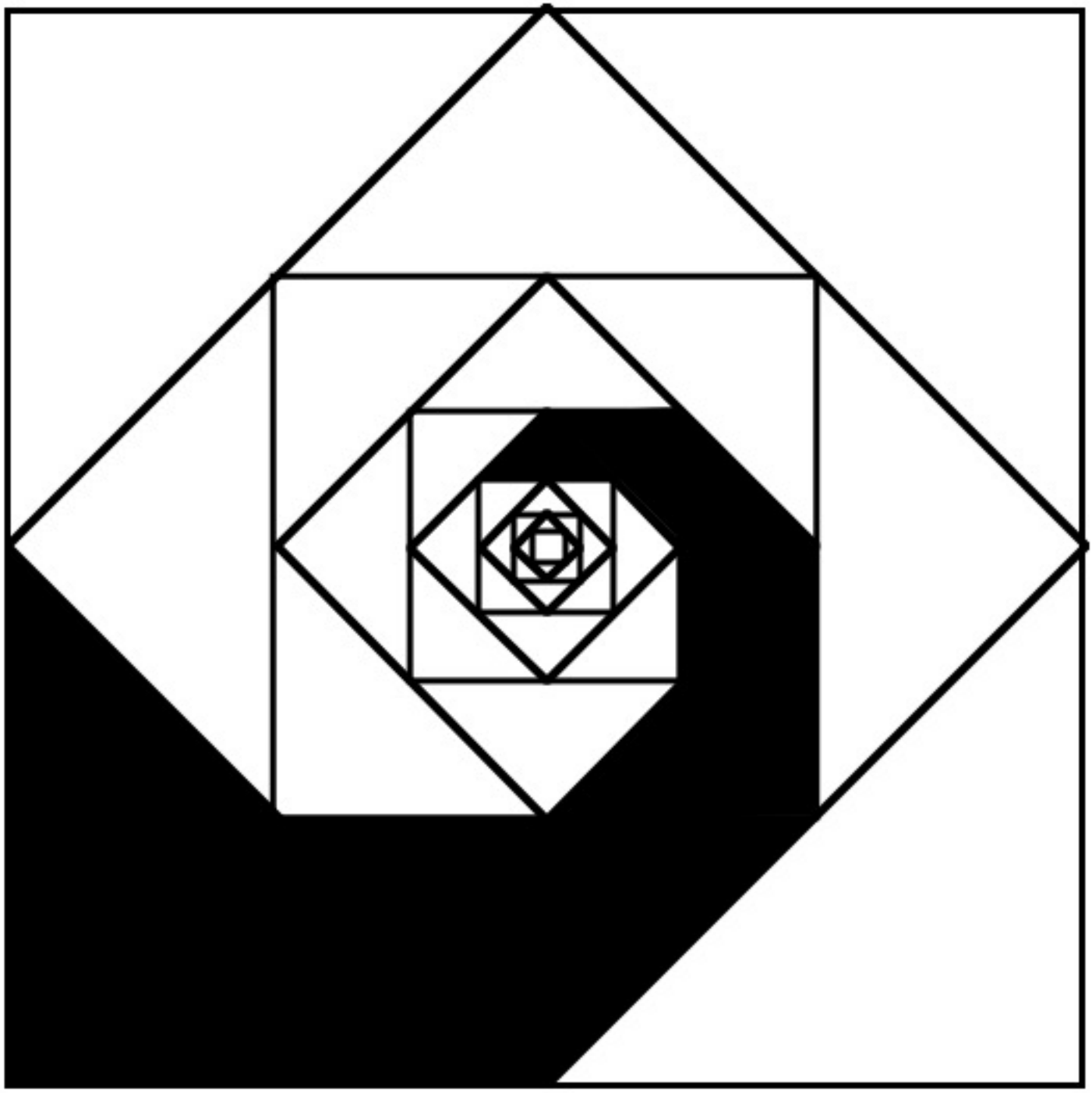

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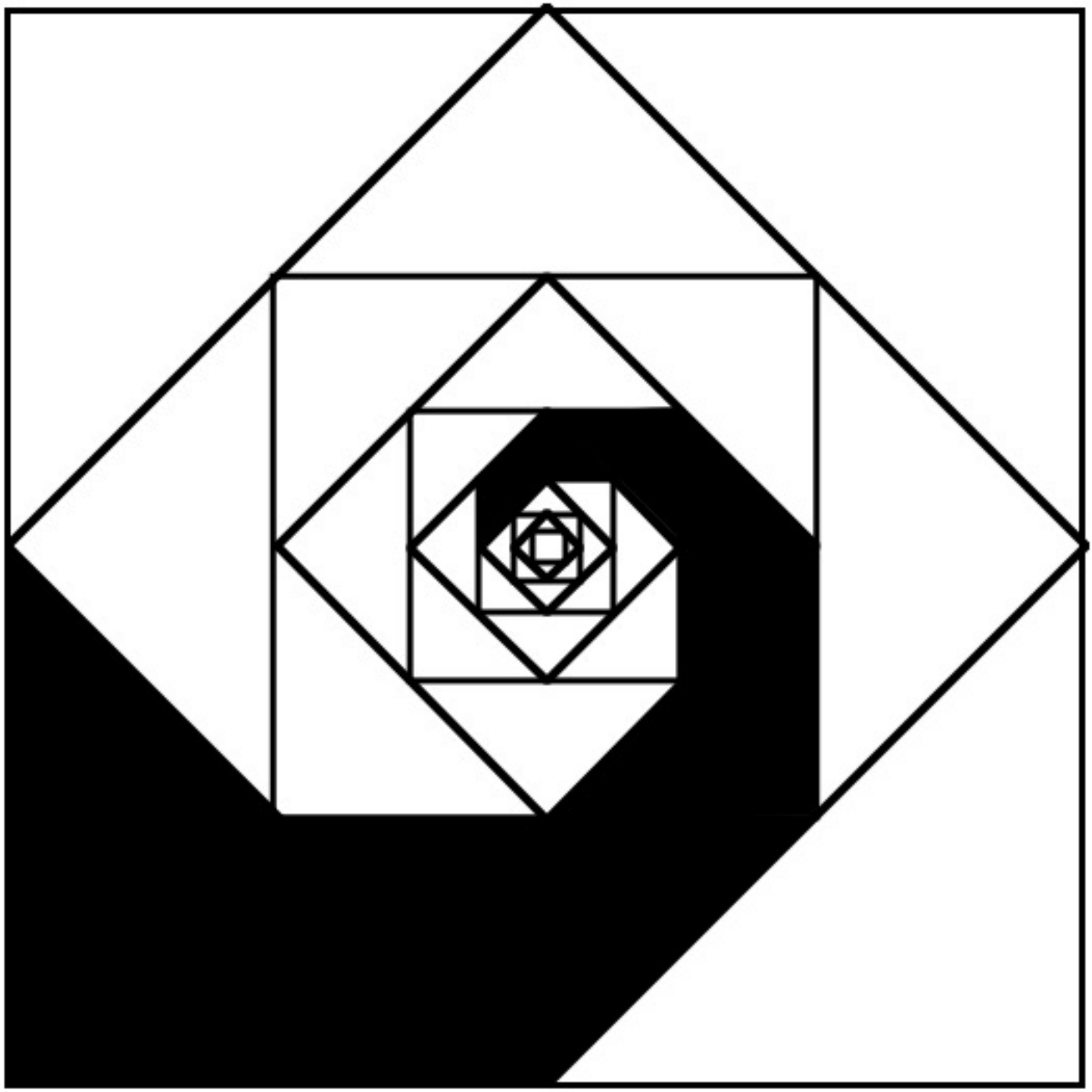

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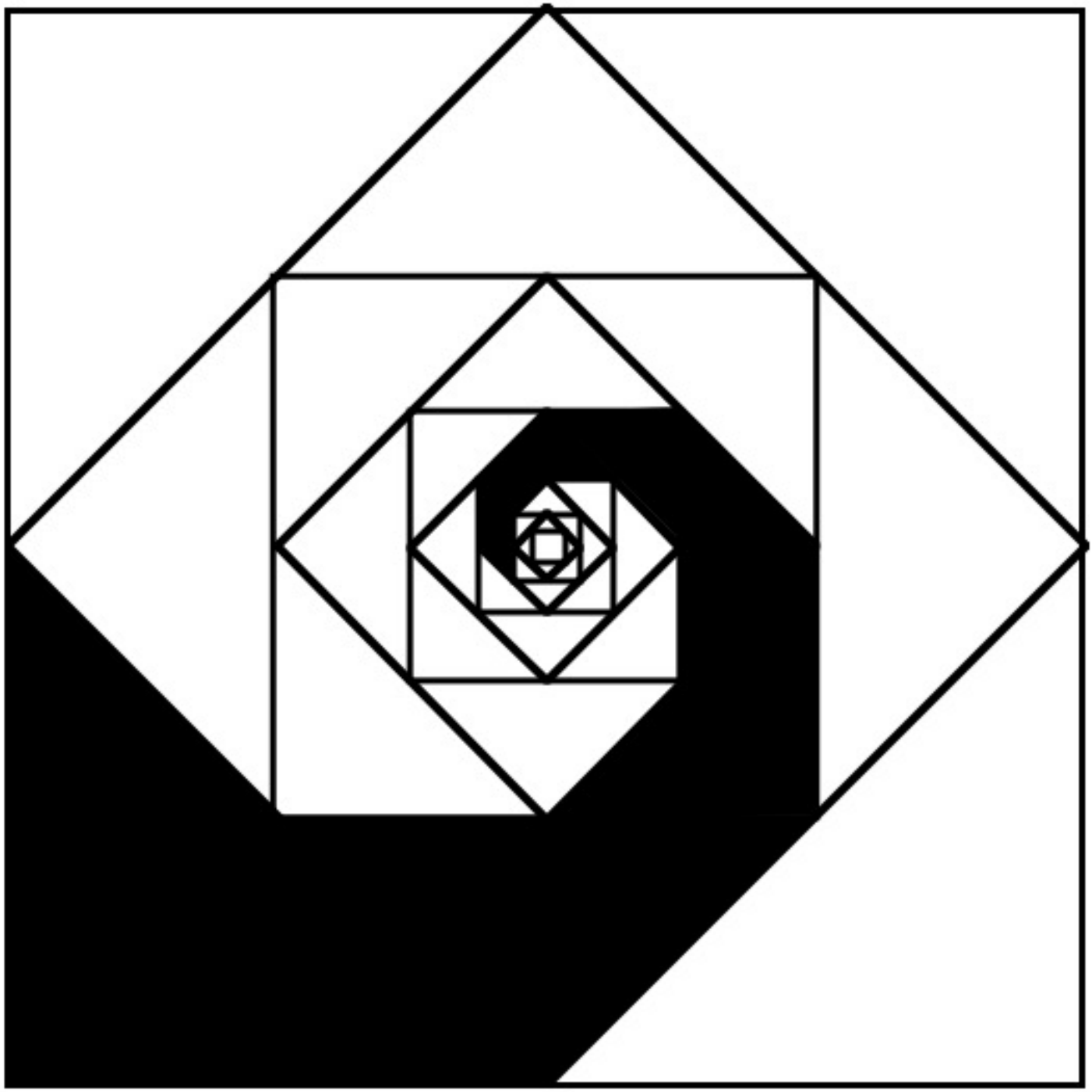

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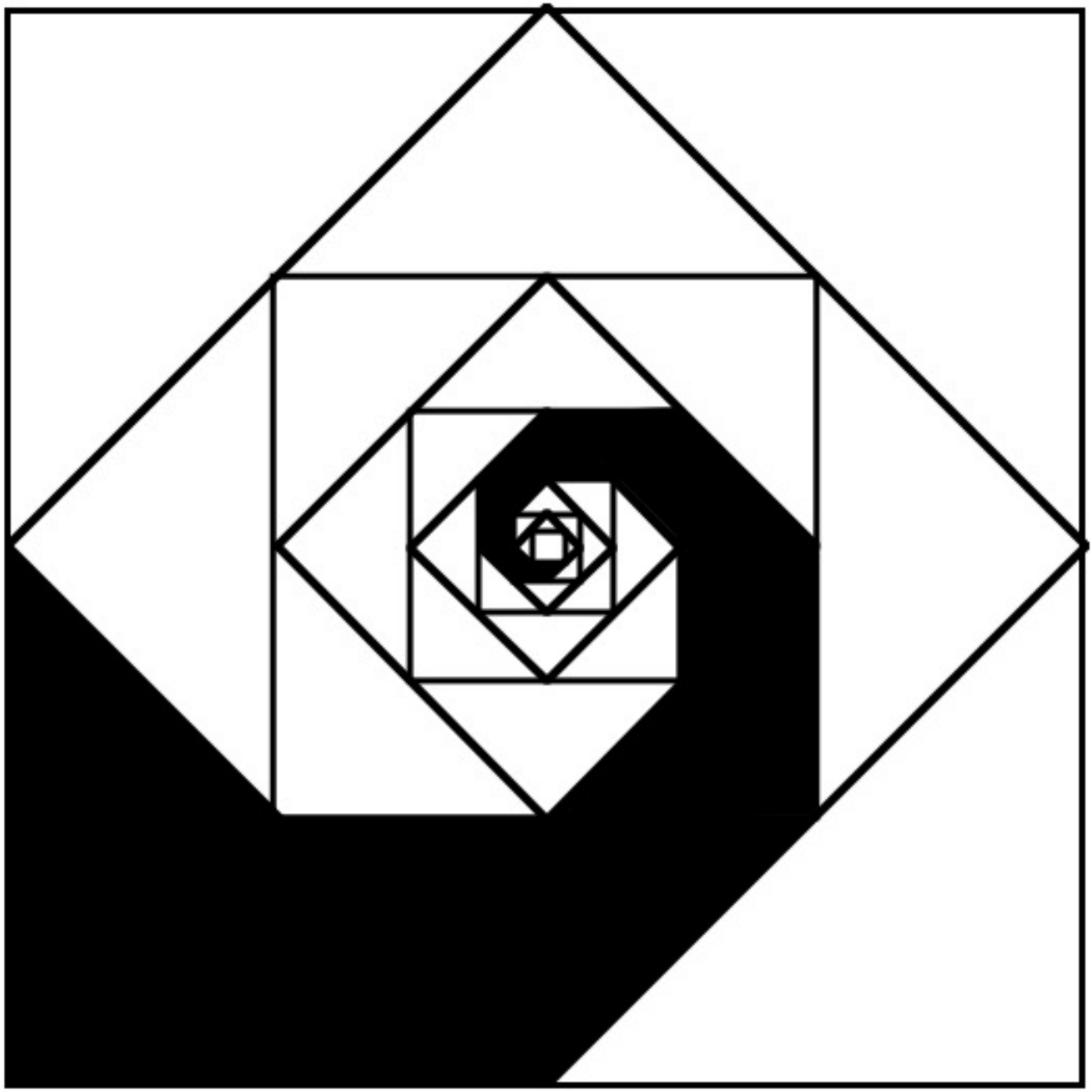

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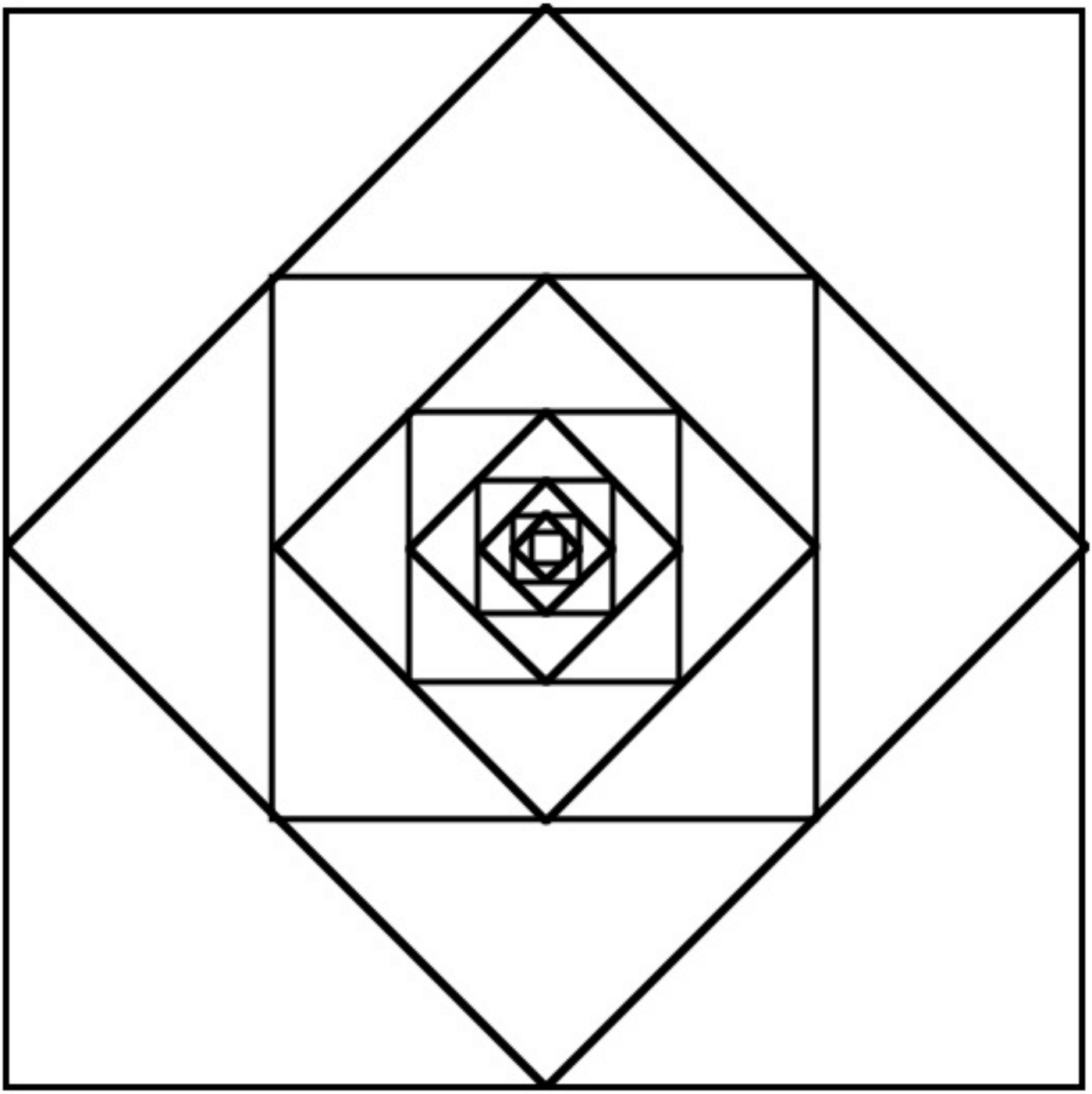

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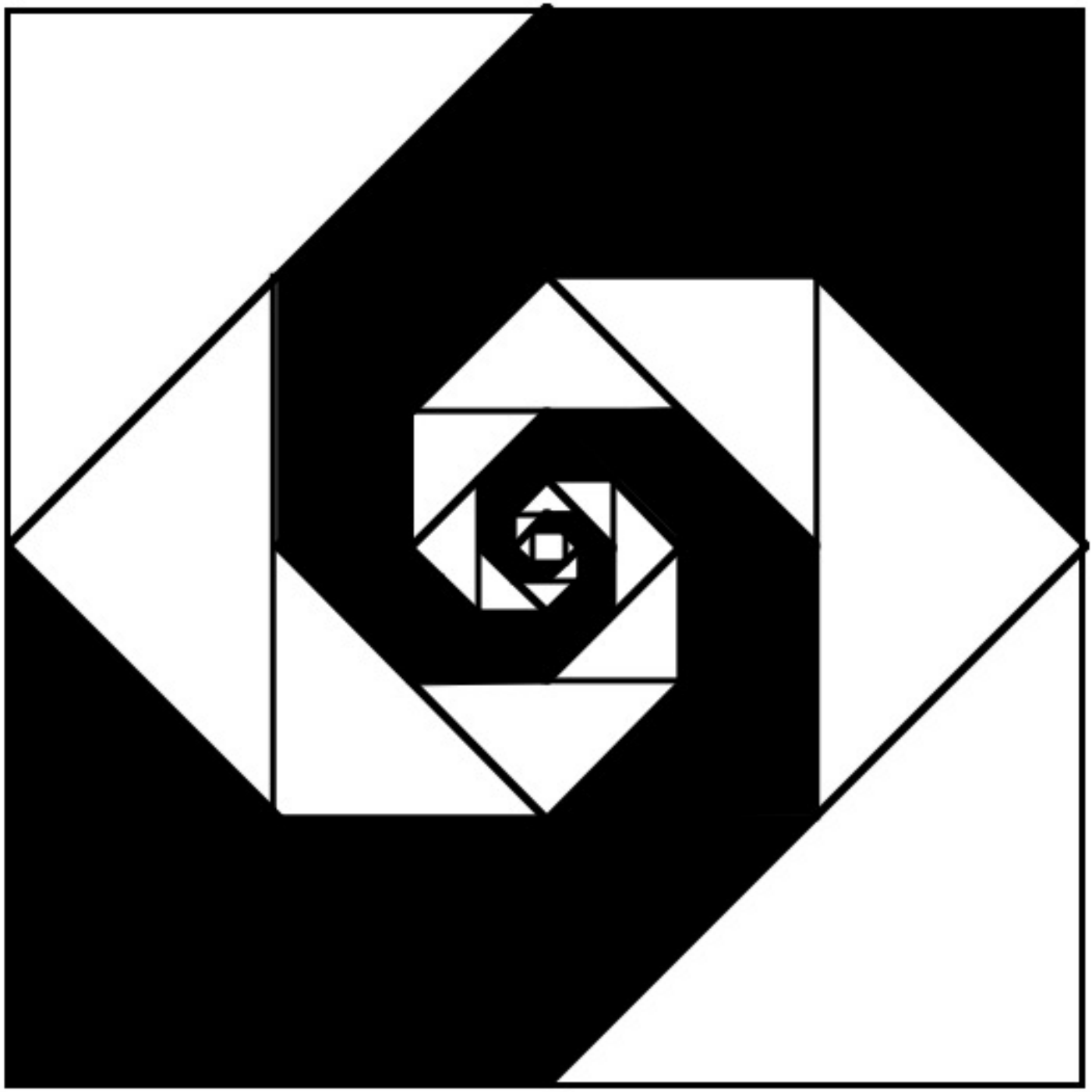

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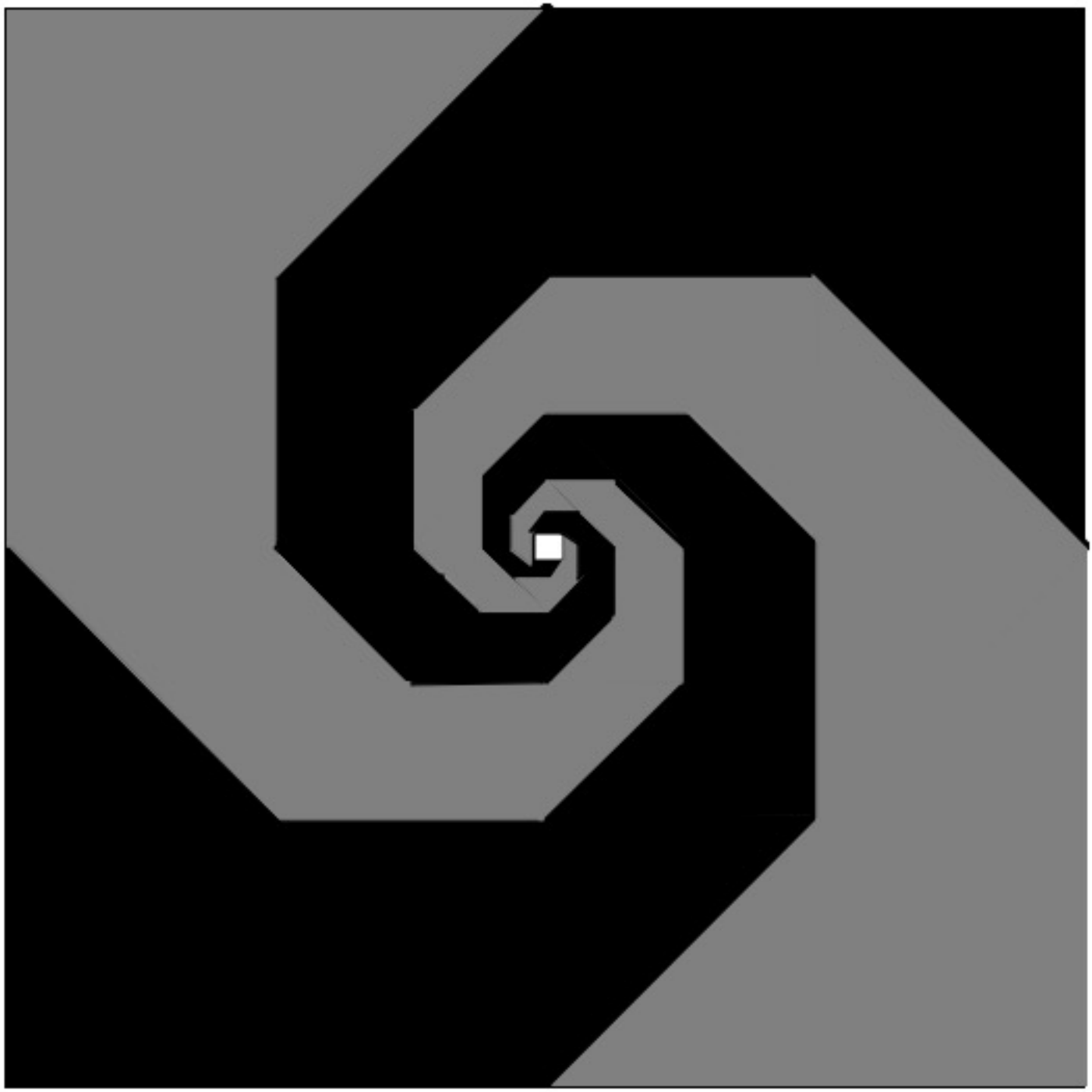

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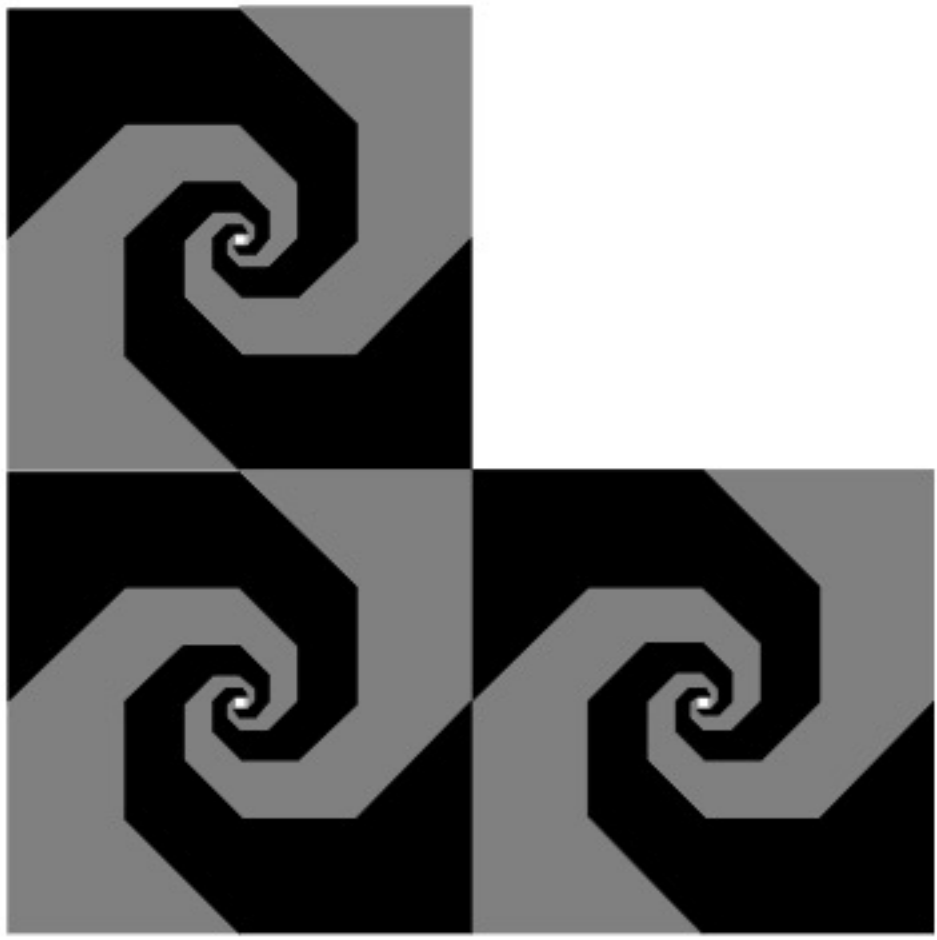

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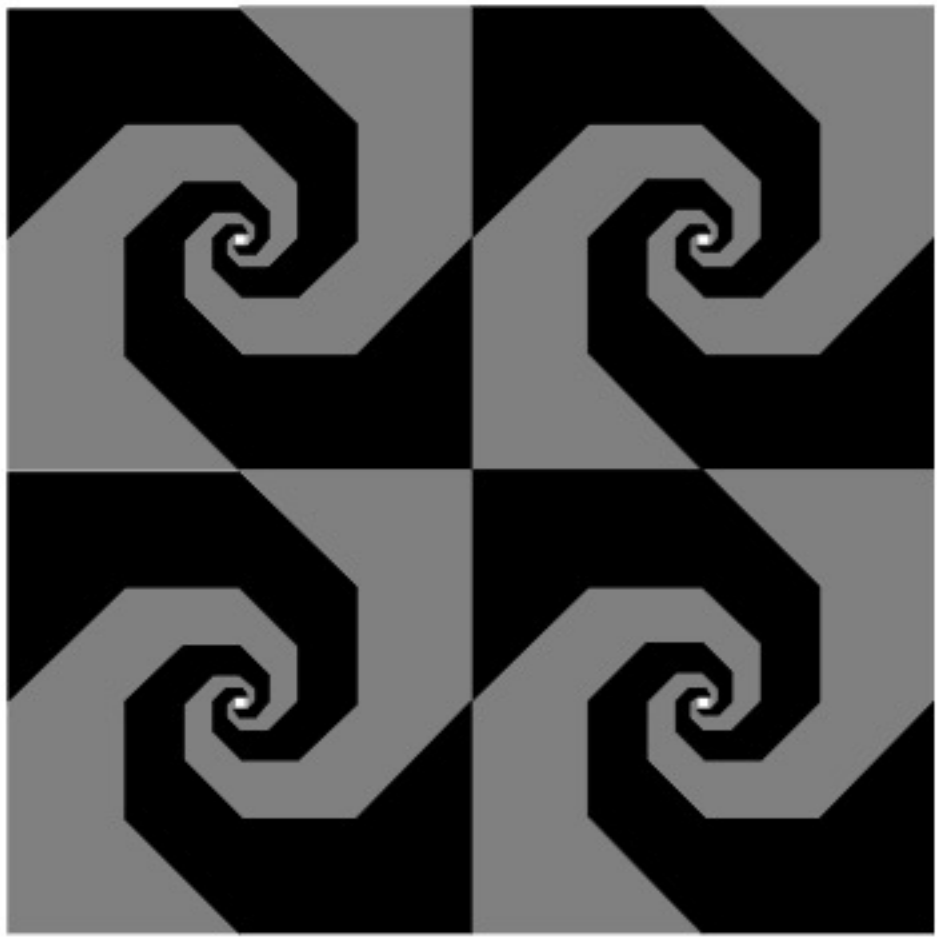

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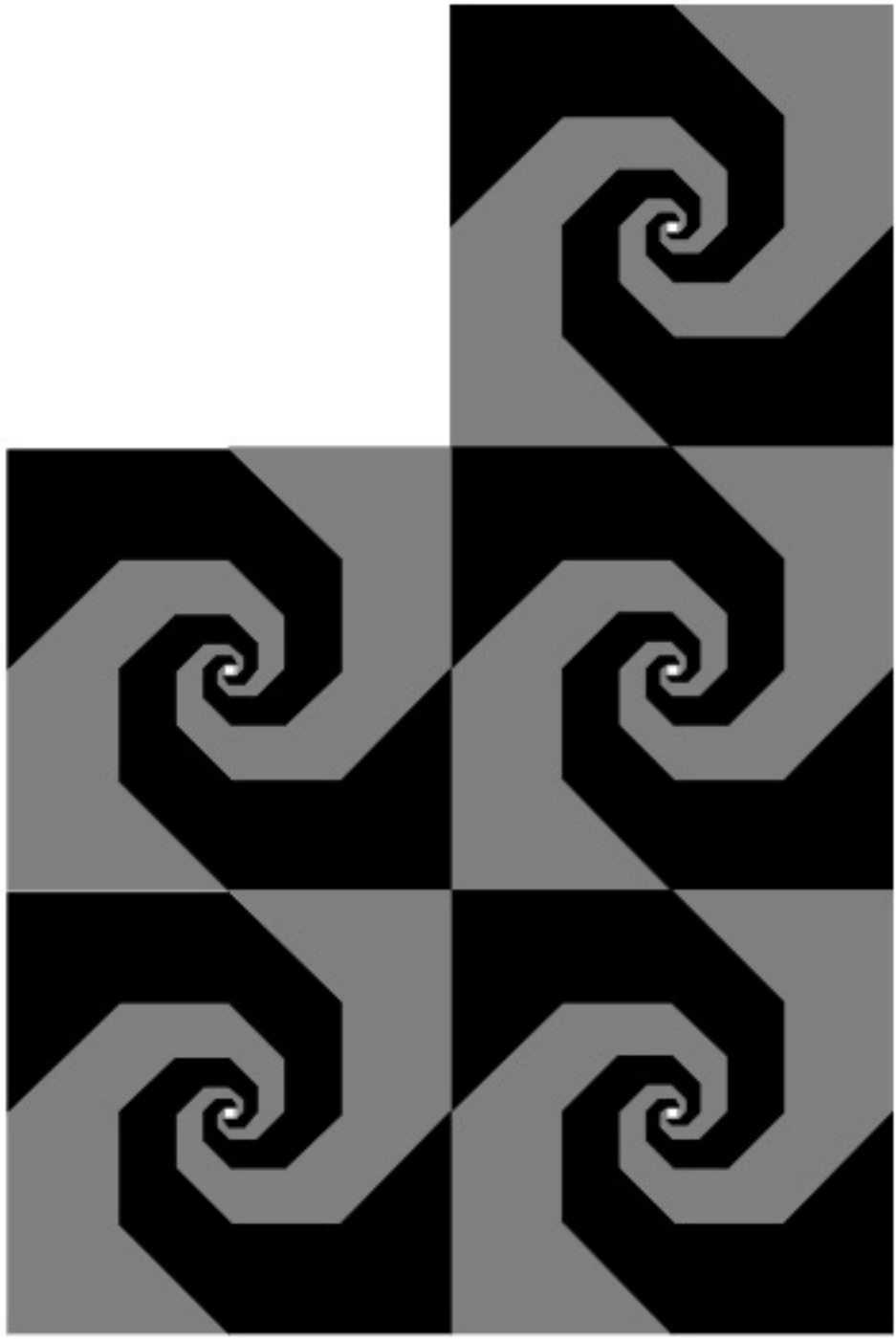

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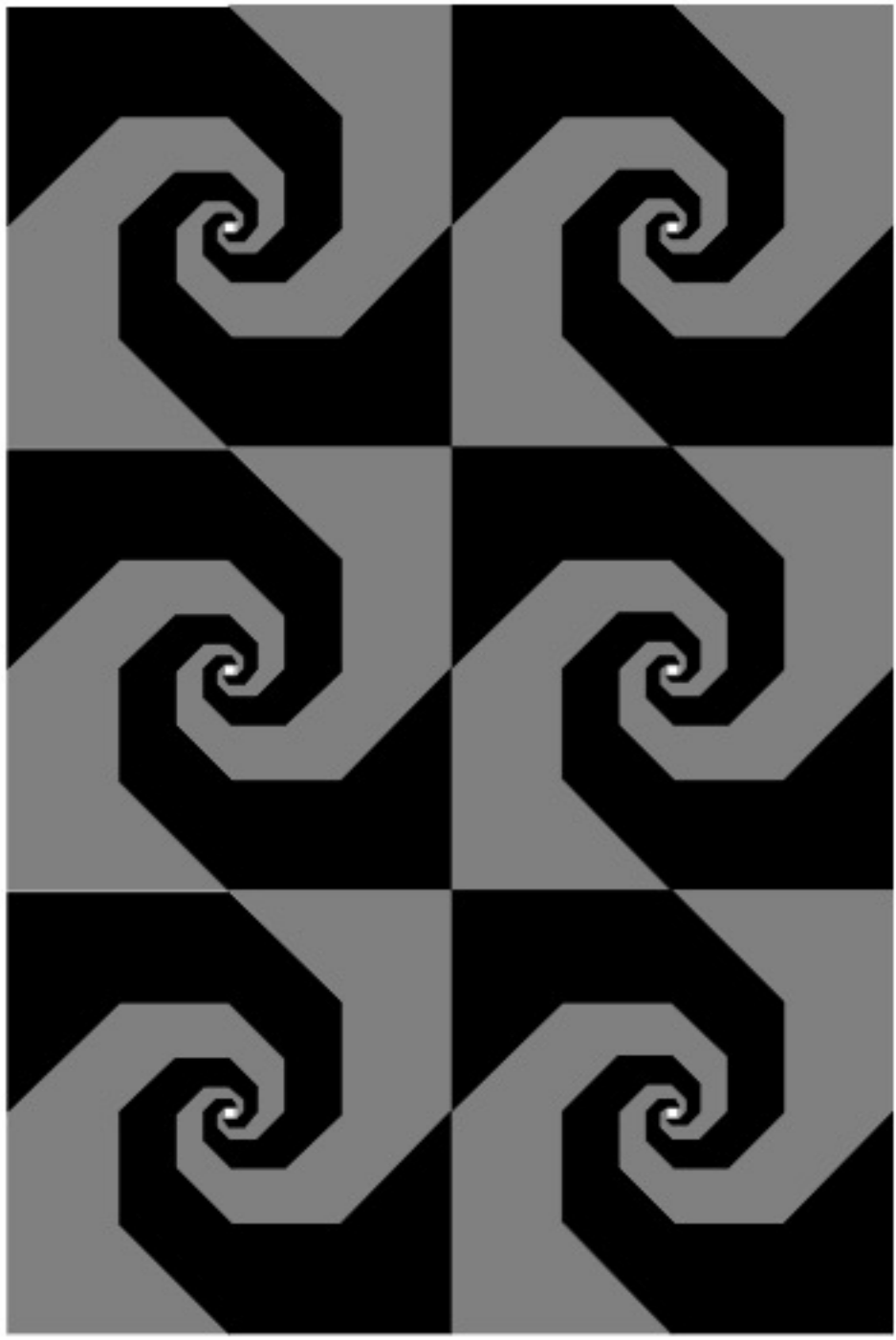

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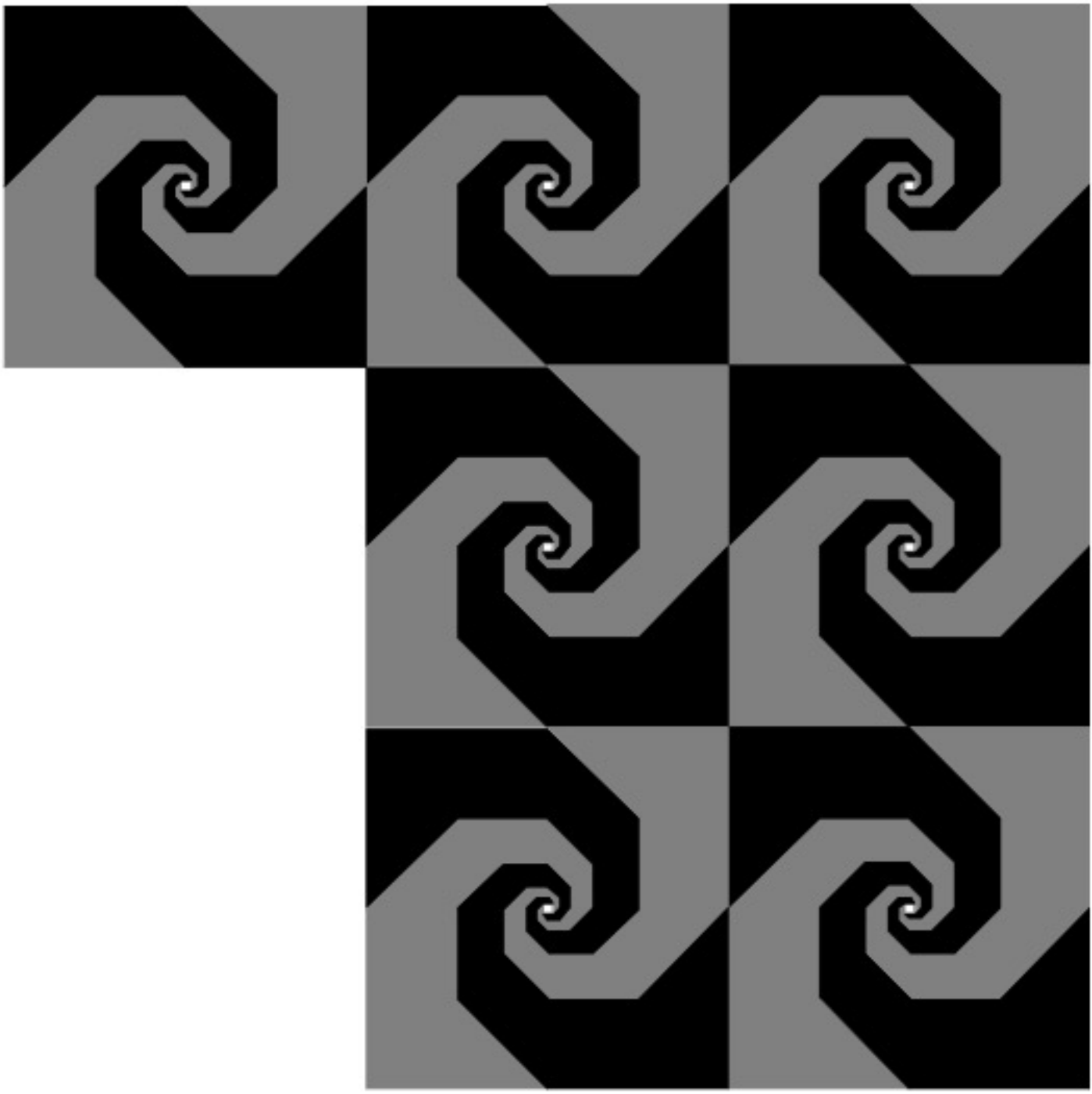

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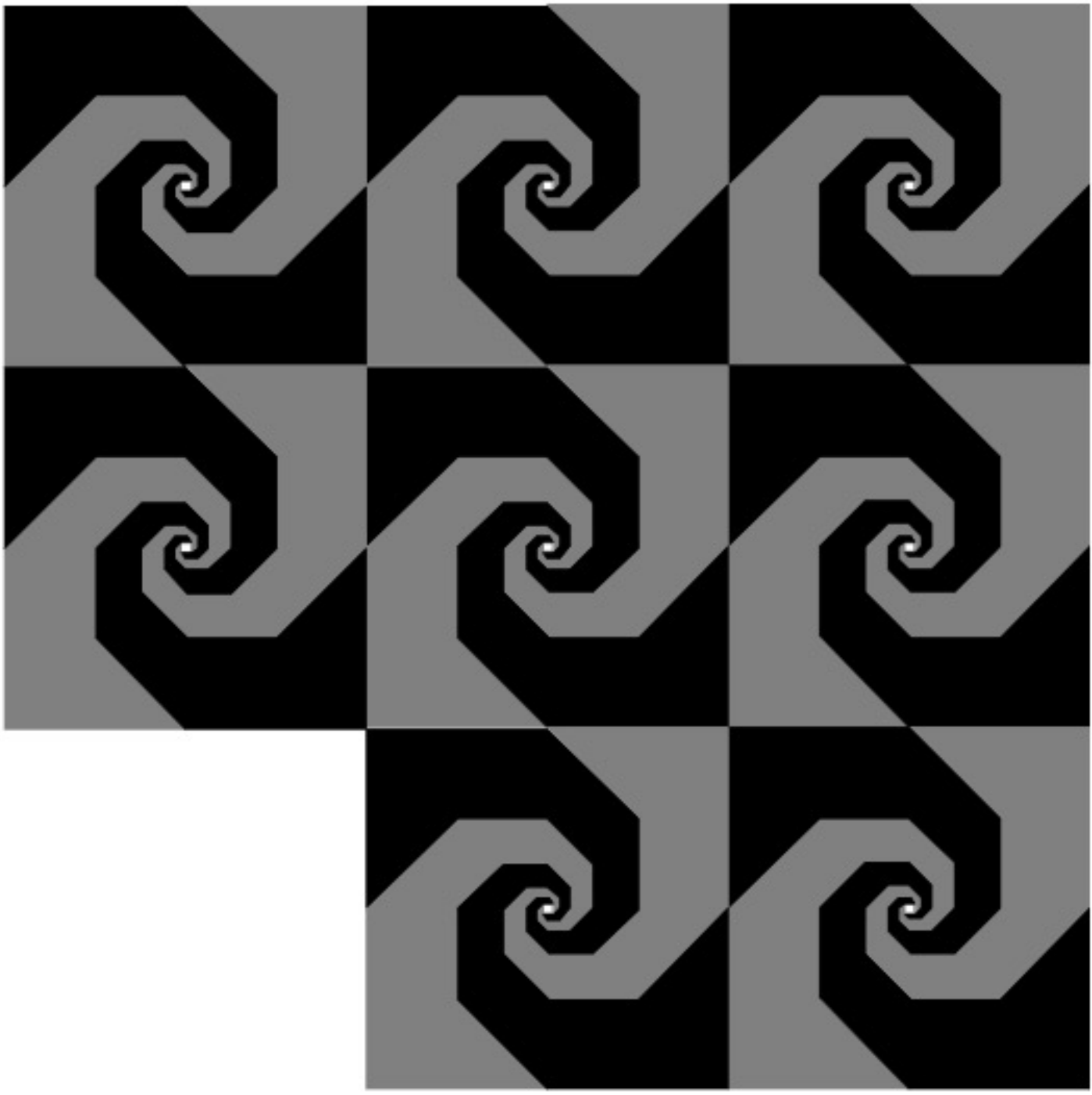

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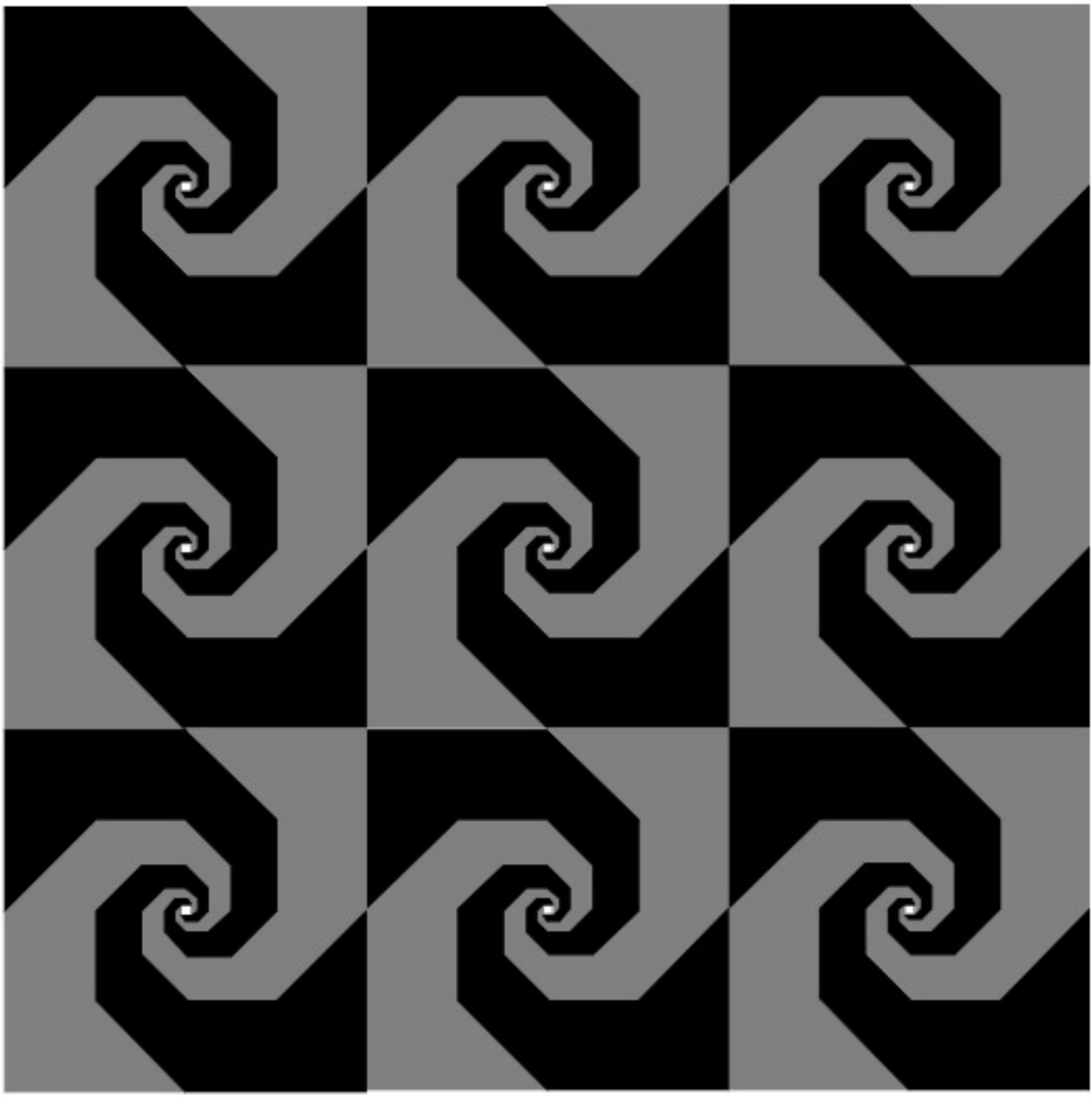

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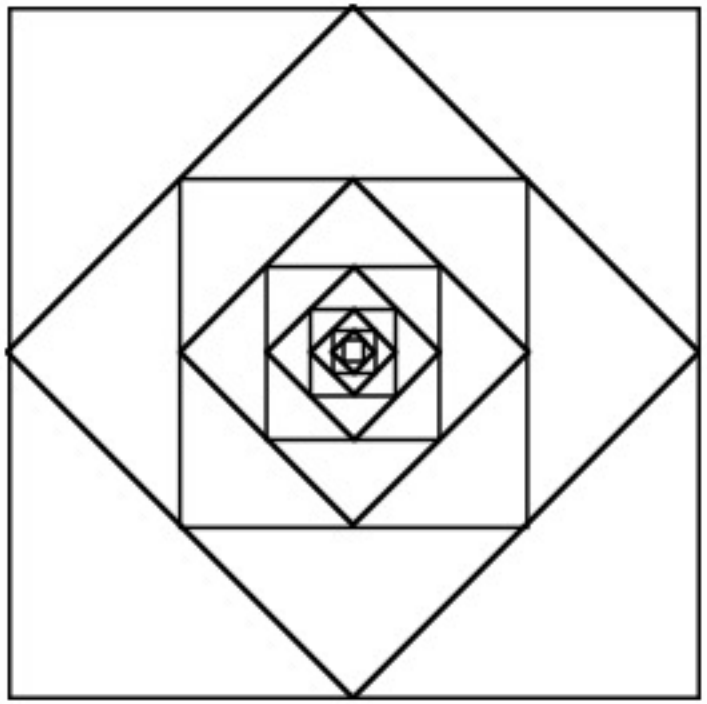
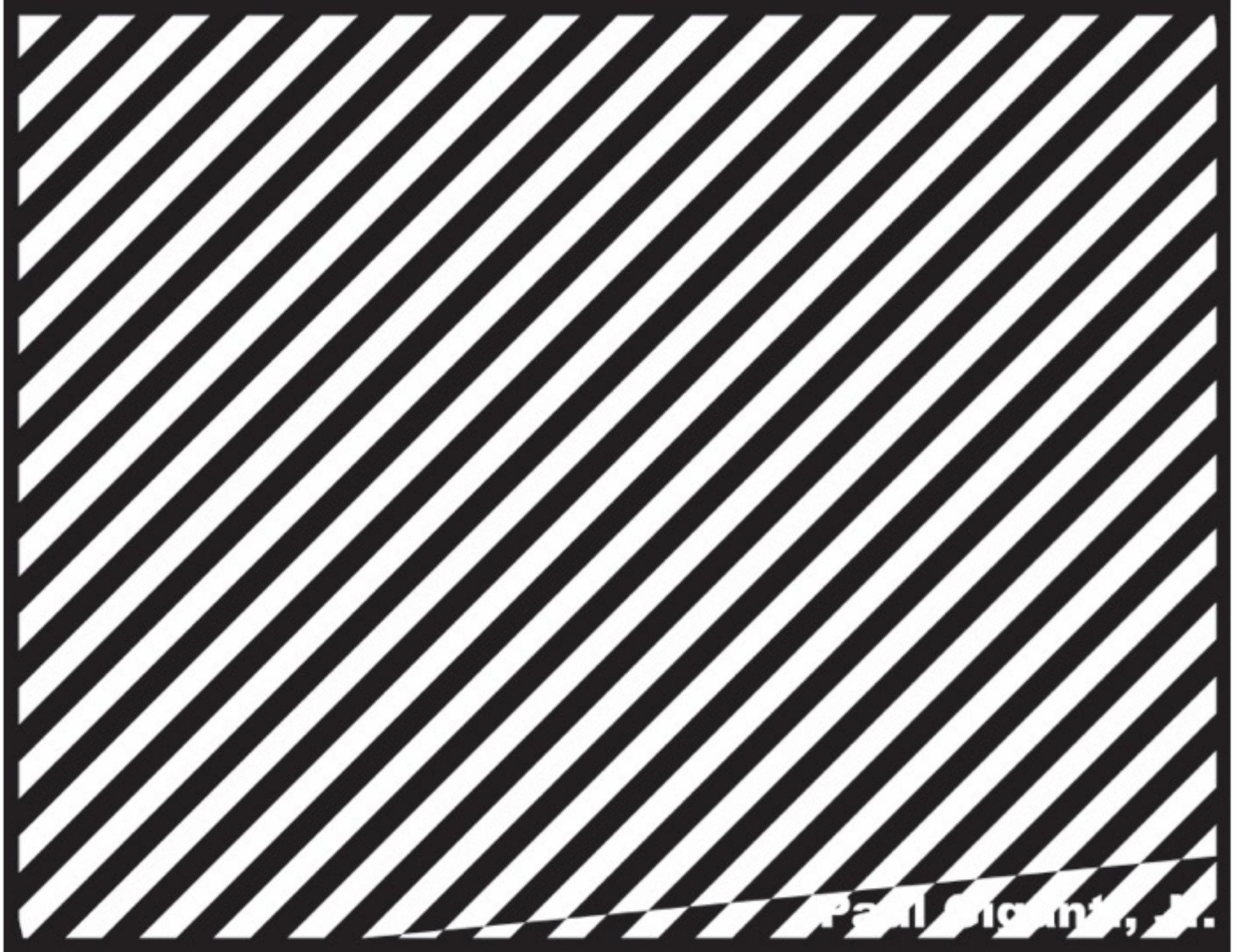


Directions…

- Start with a square
- Find the midpoint of each side of the square
- Using the four midpoints, draw a new square
- Find the midpoints of the new square
- So on, so forth…
- Until you cannot draw any more squares

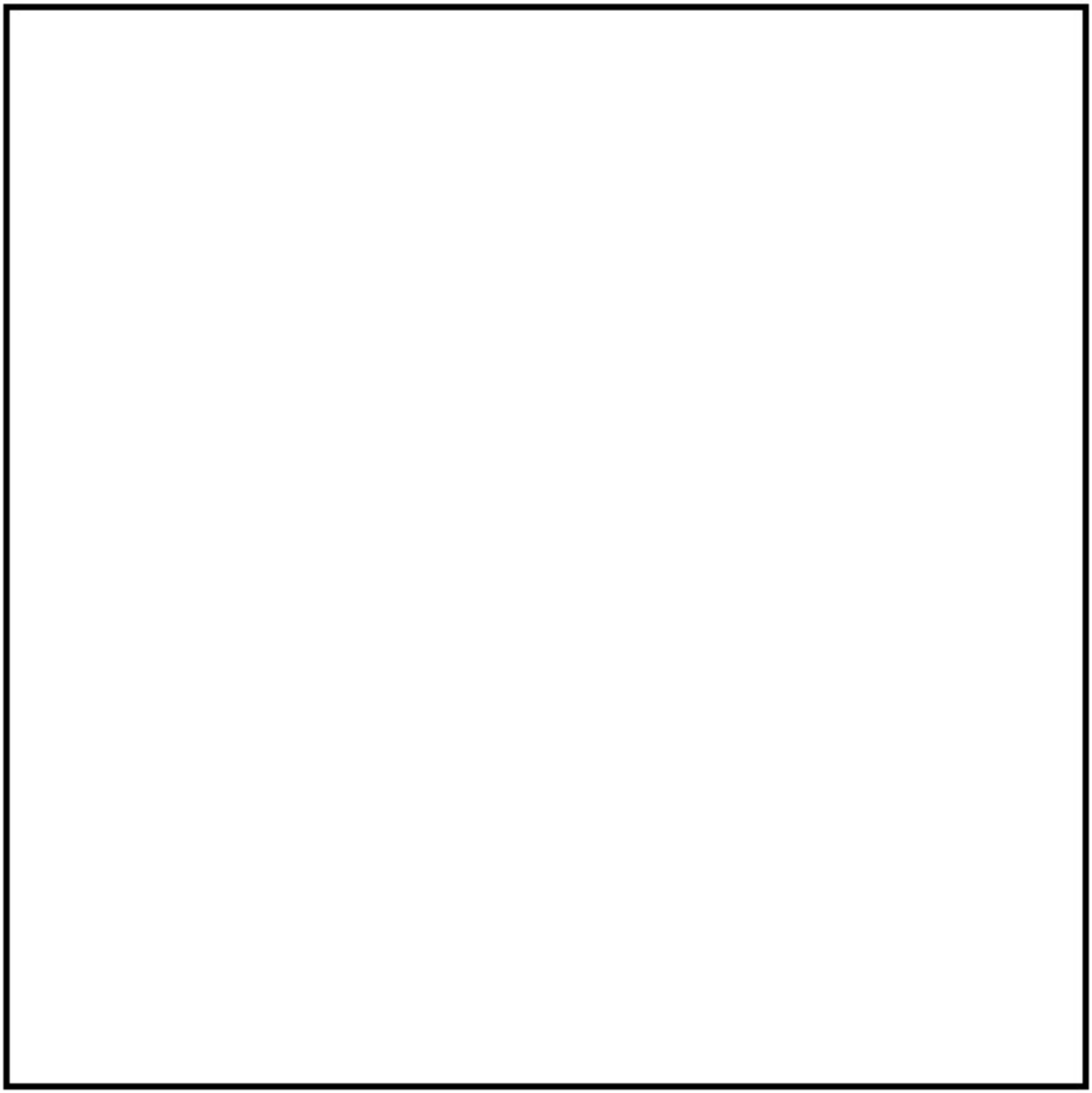
*Remember, color your squares in either contrasting colors or into spirals

Paul Giganti, Jr.



UP THE DOWN STAIRCASE

Bel Kaufman



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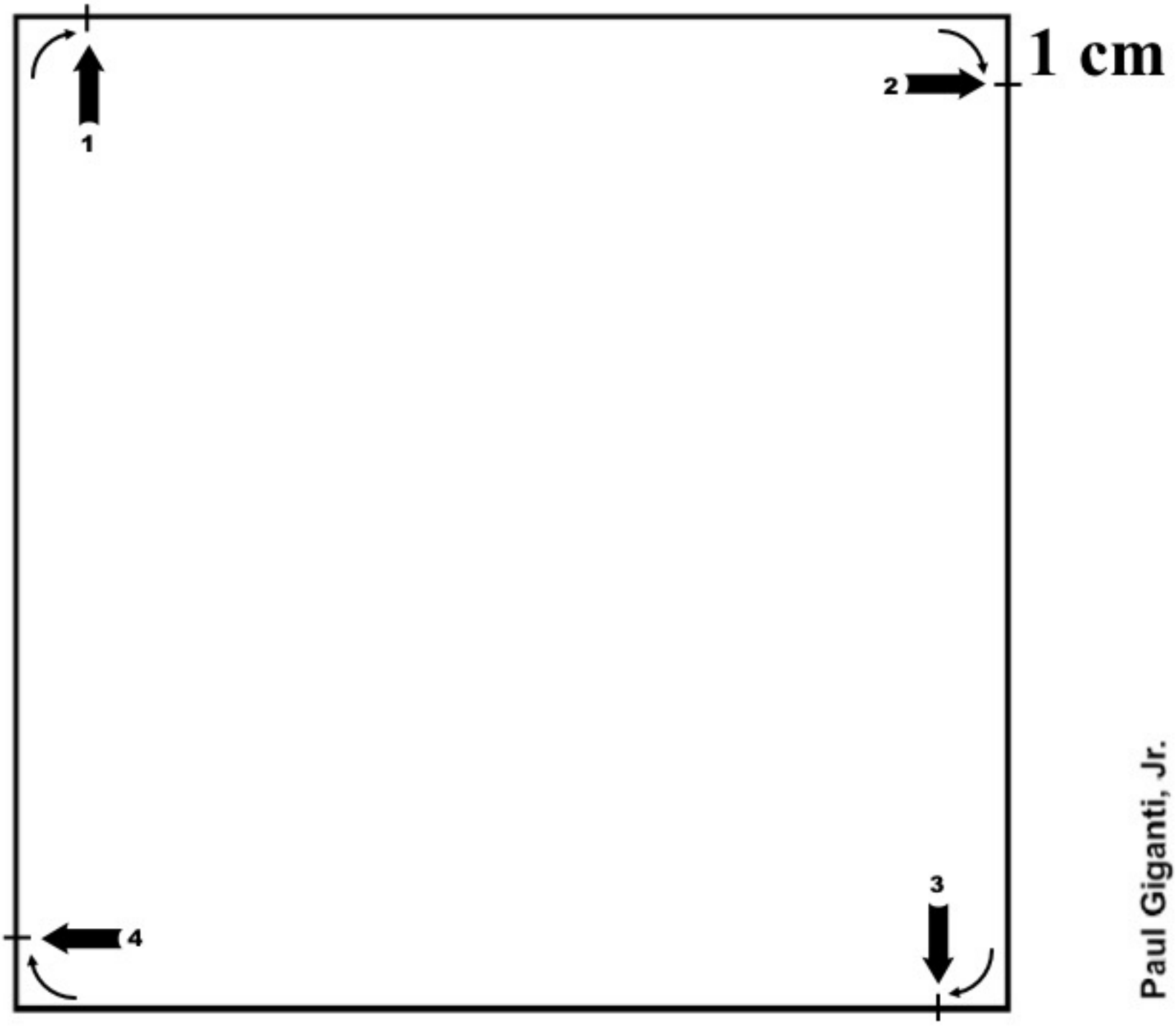

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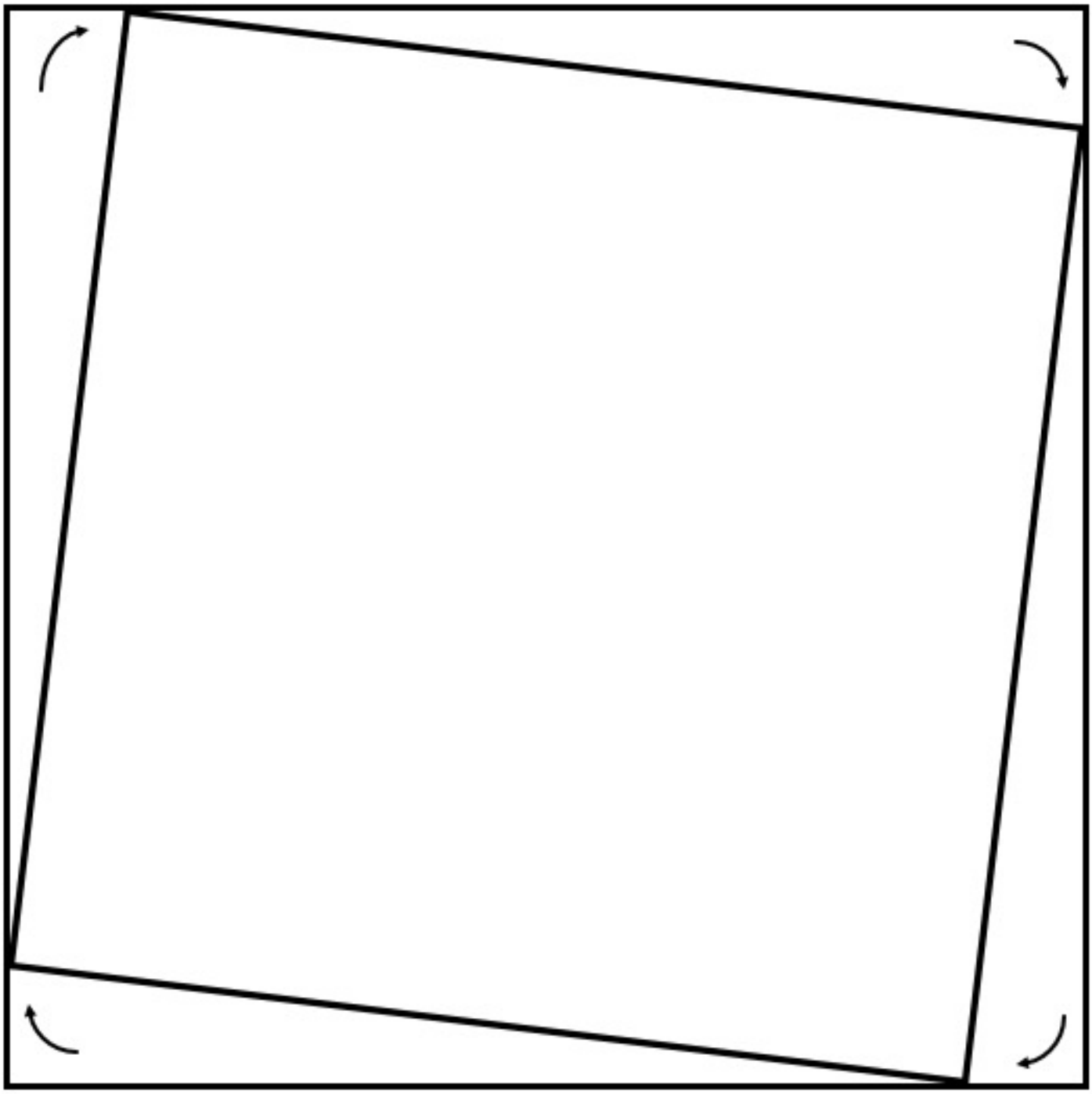

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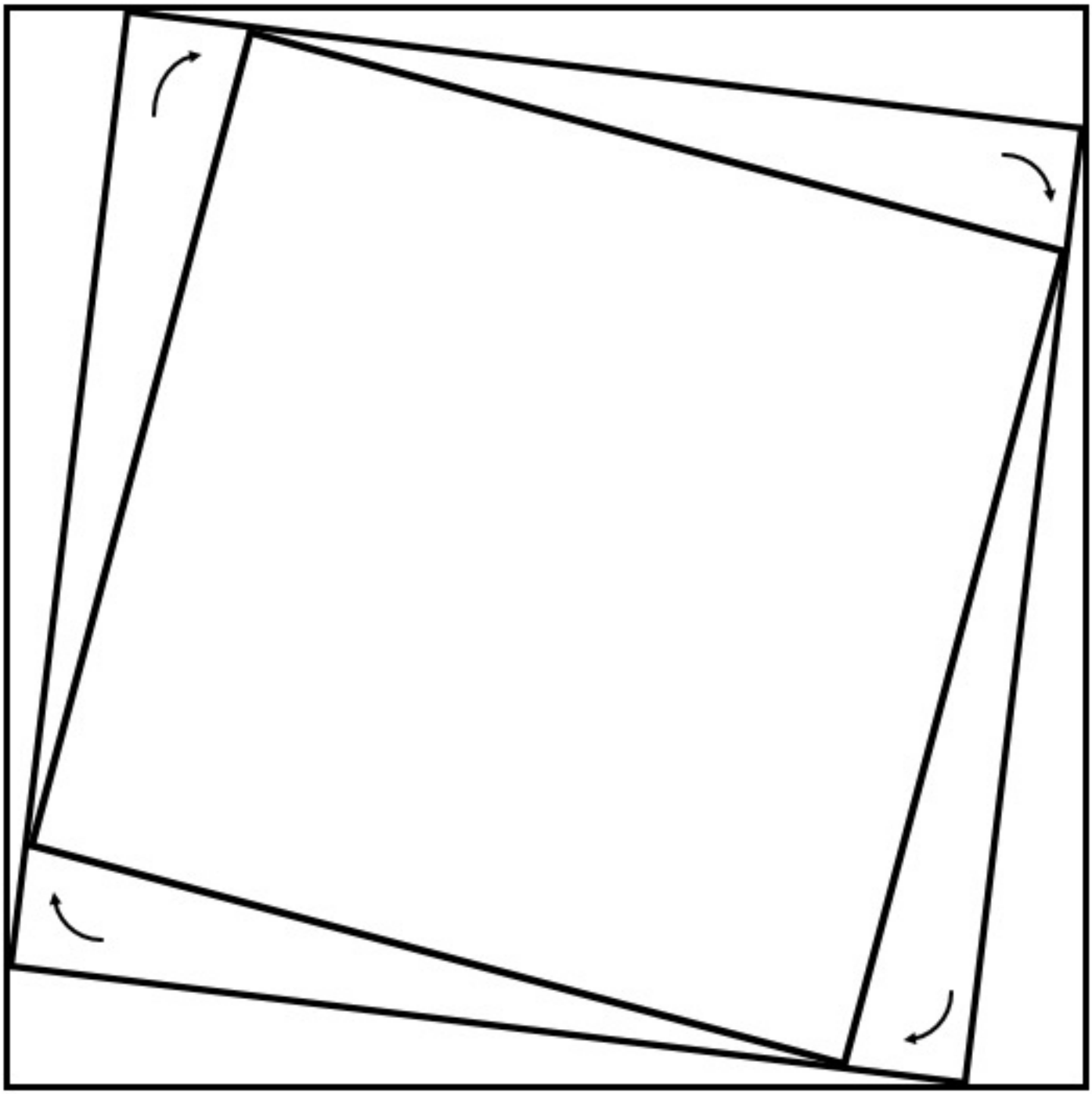

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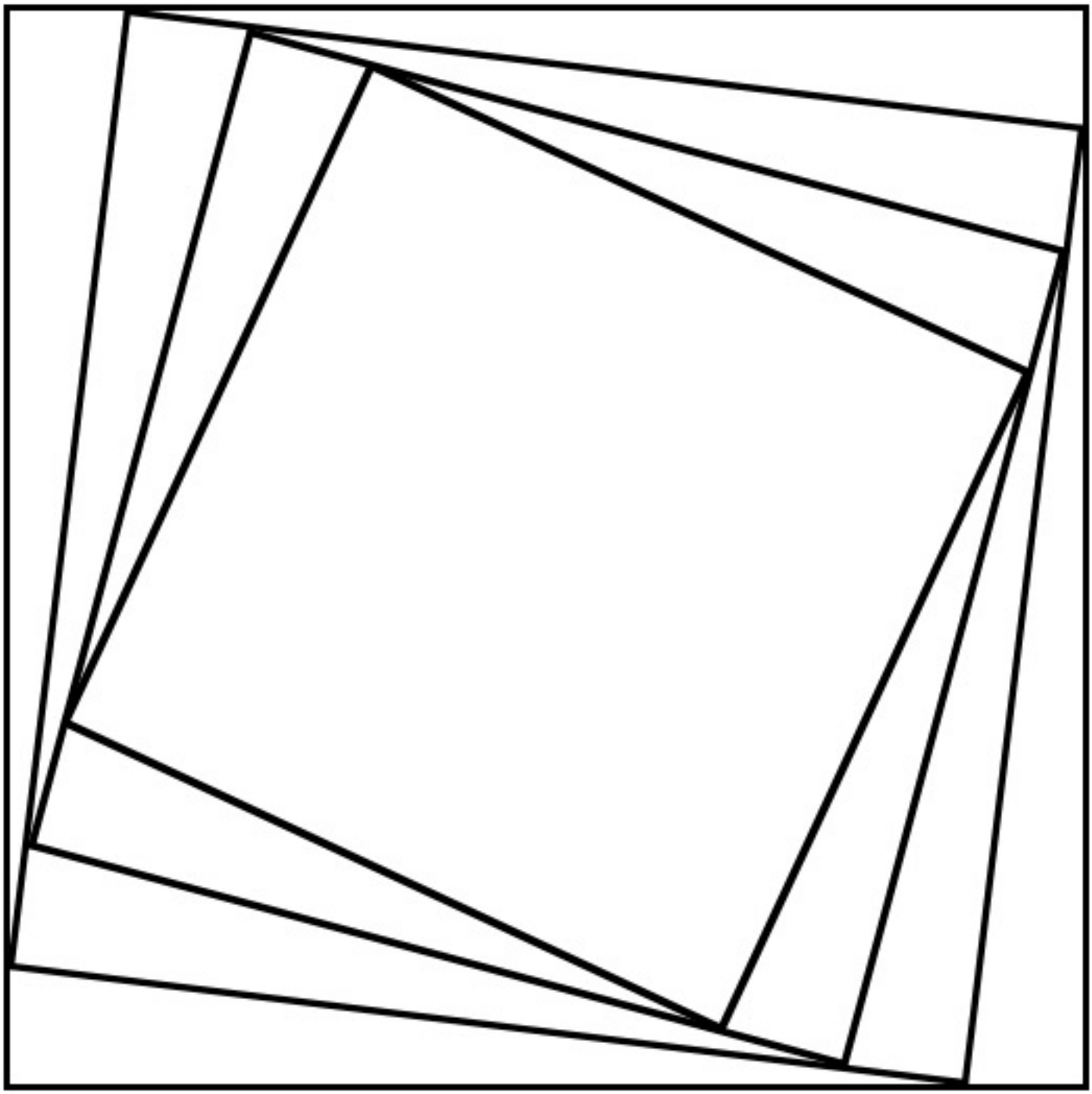

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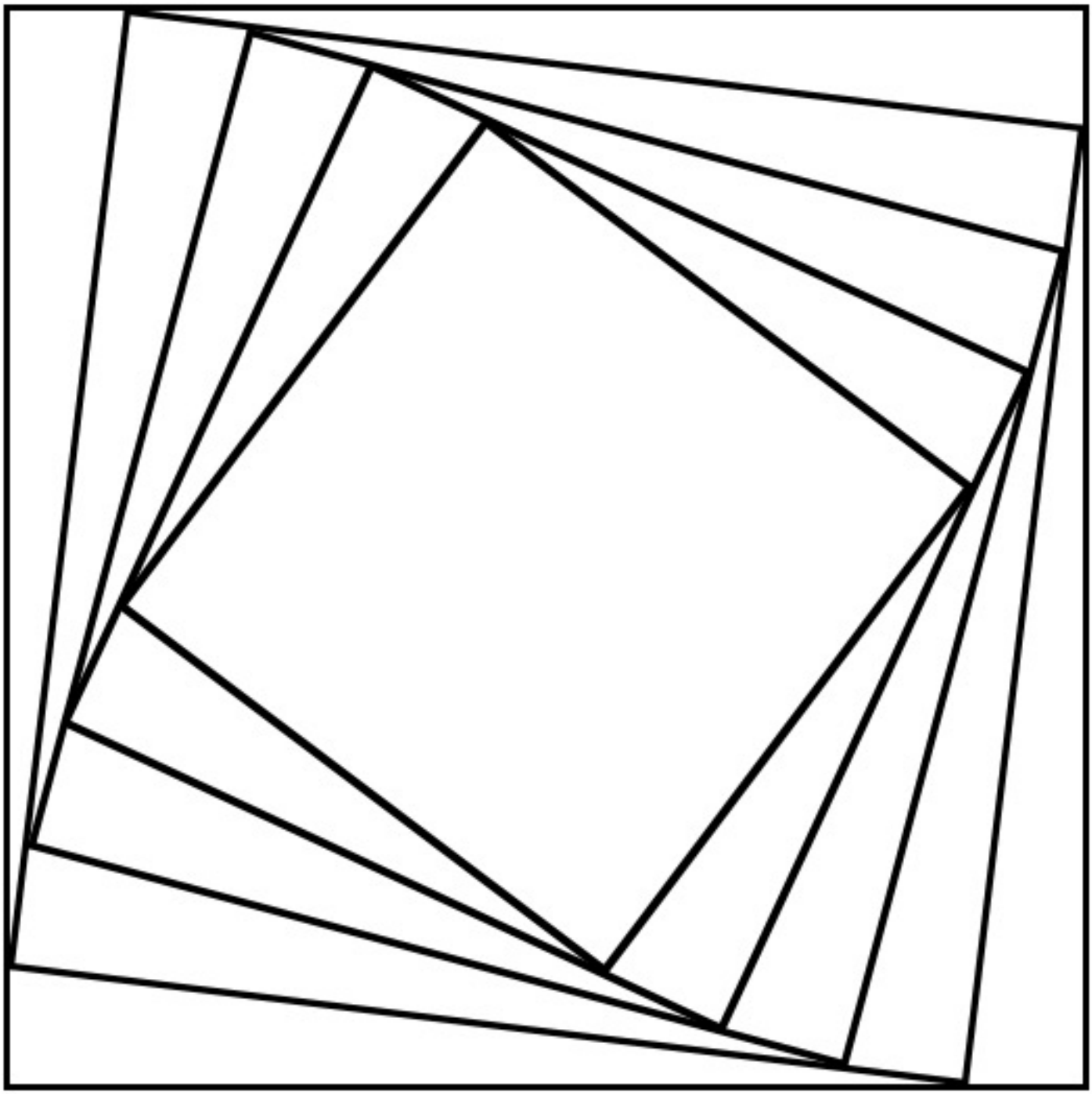

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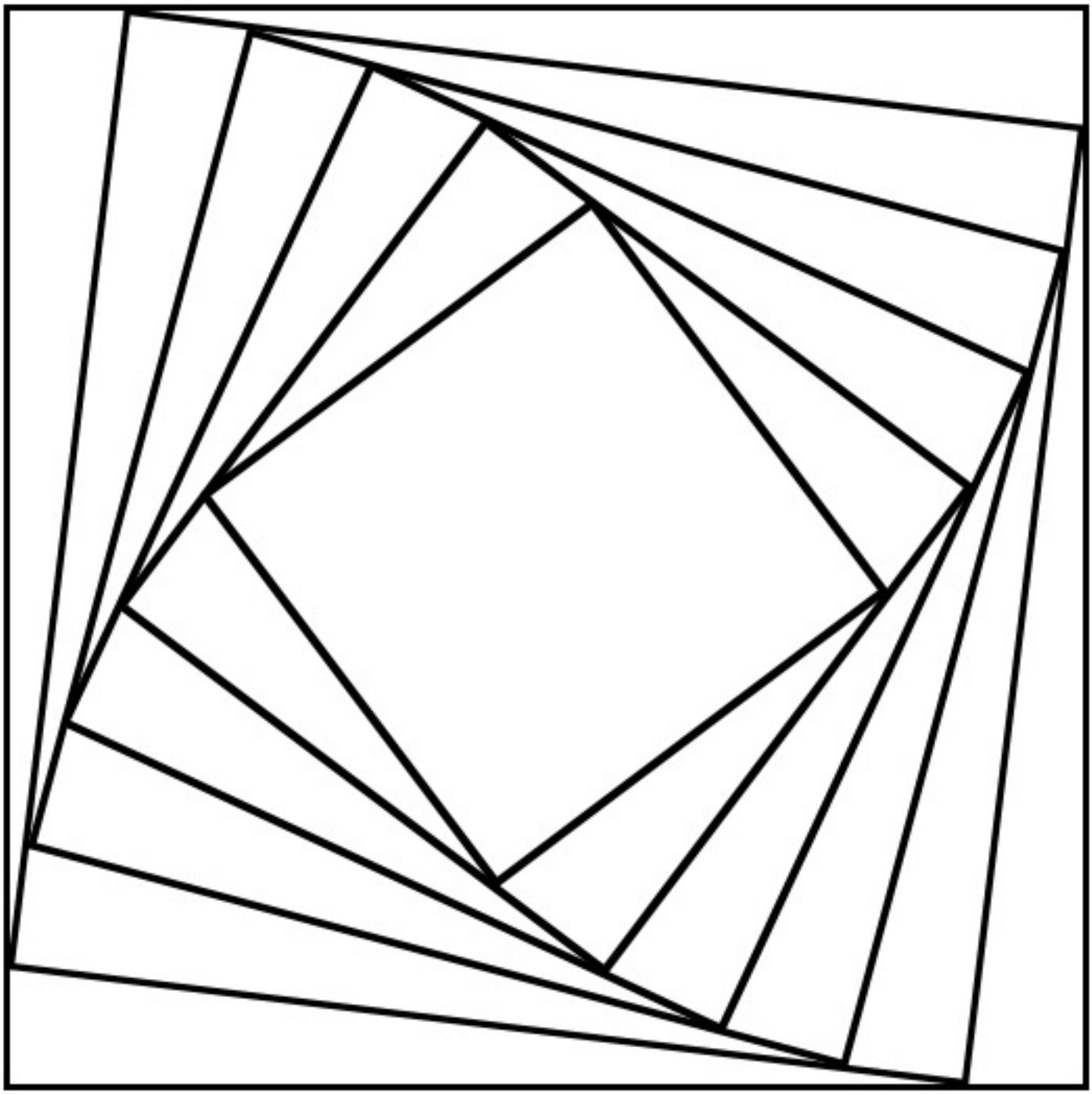
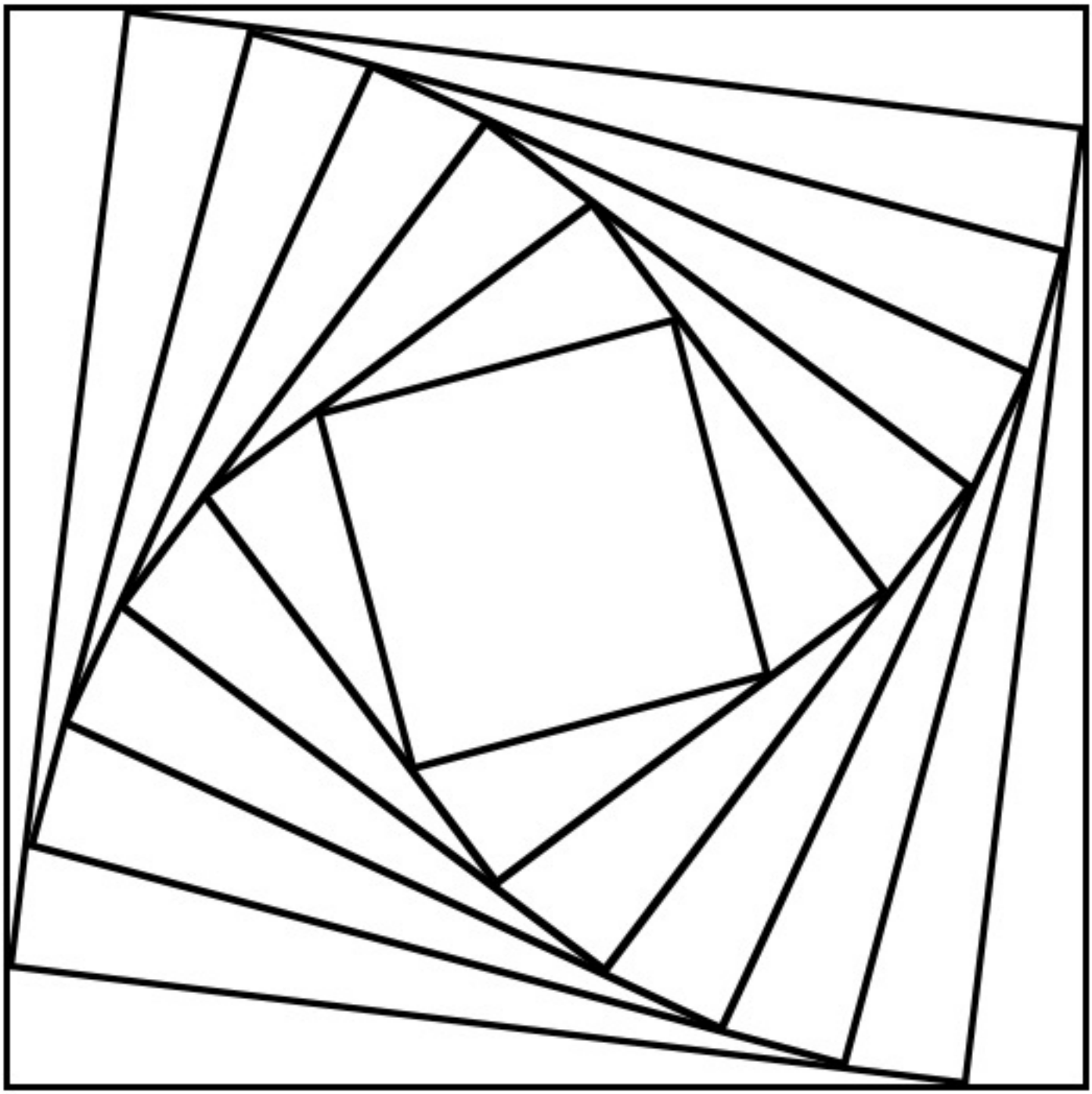


Paul Giganti, Jr.



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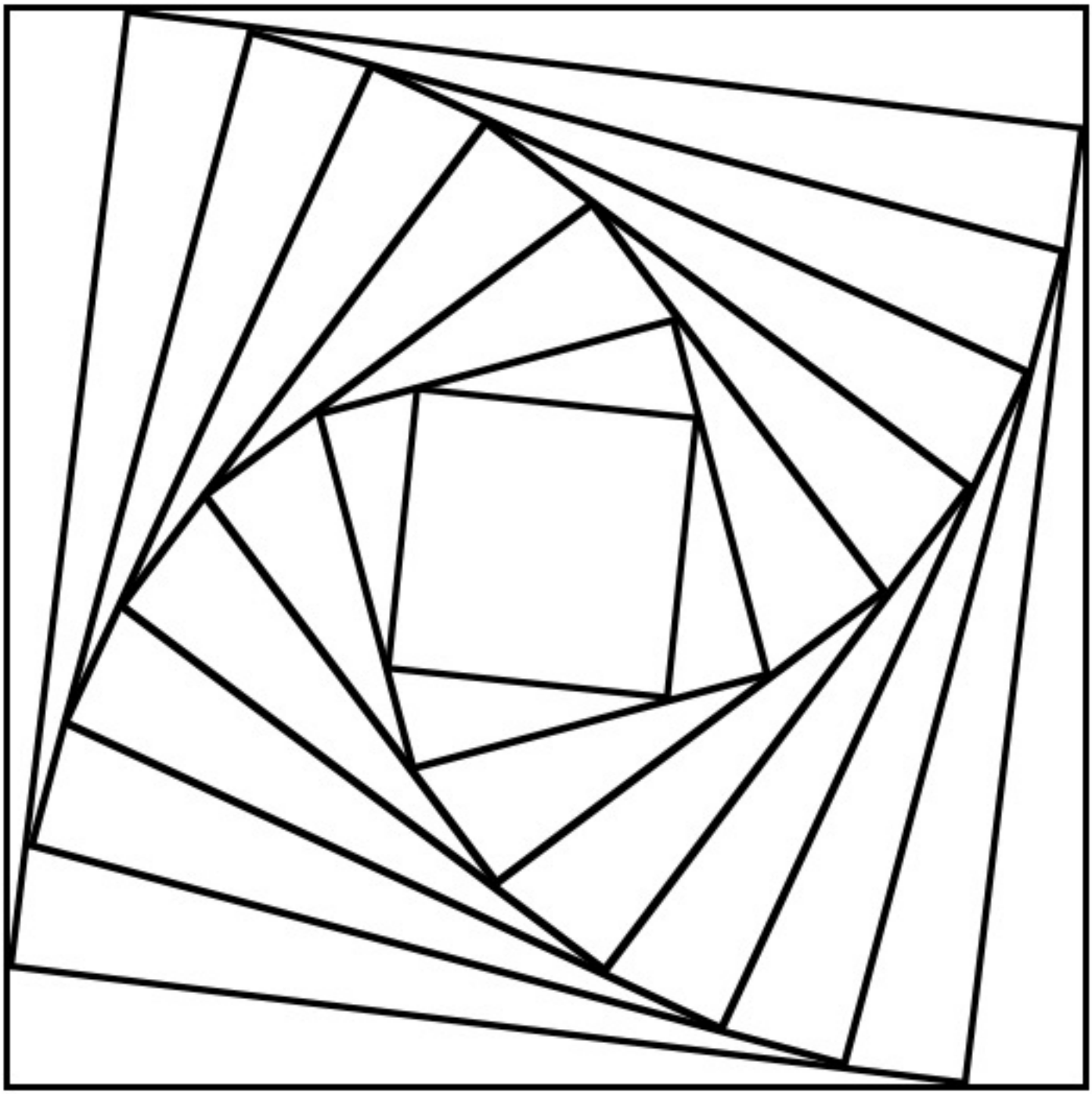

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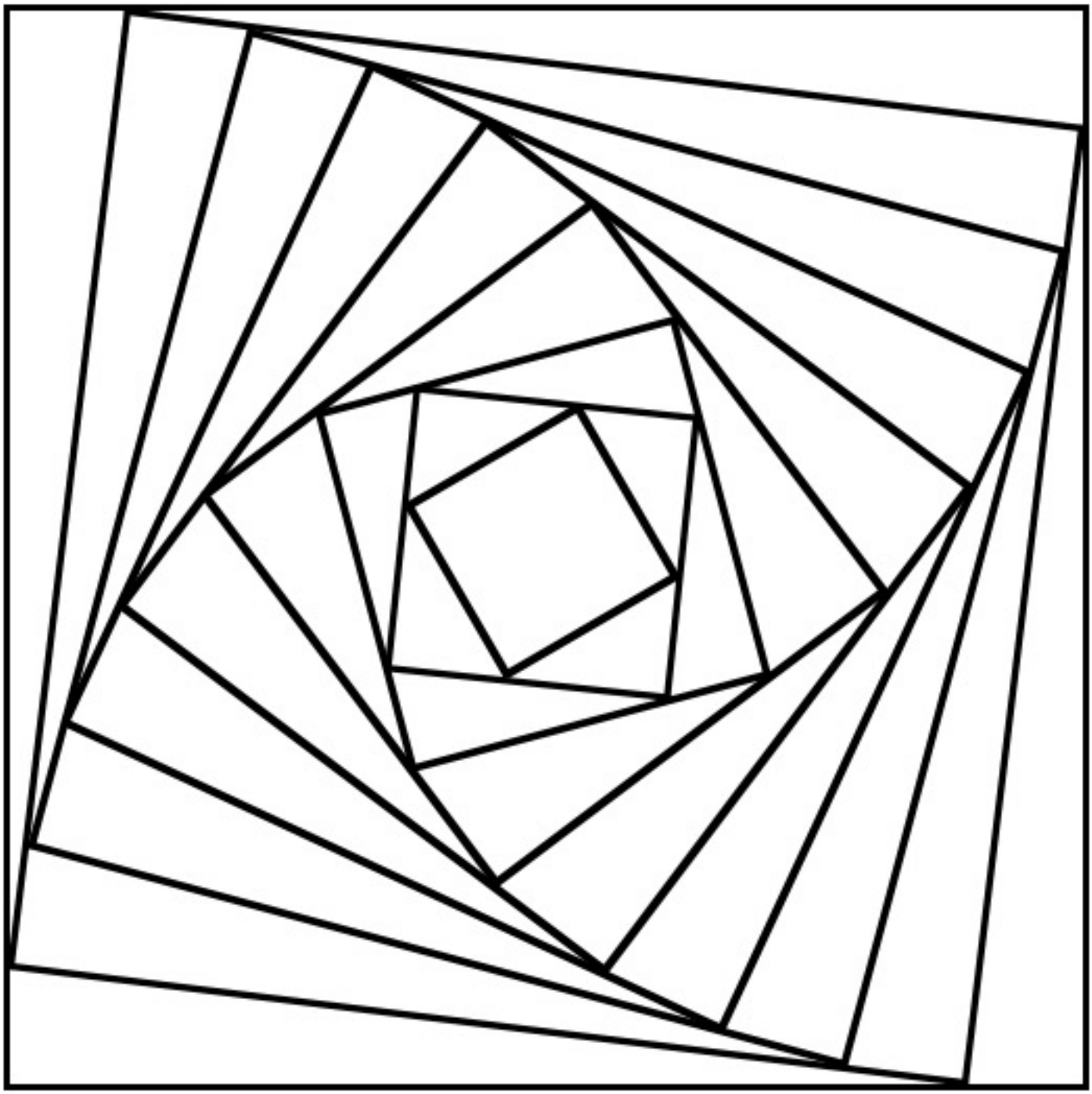

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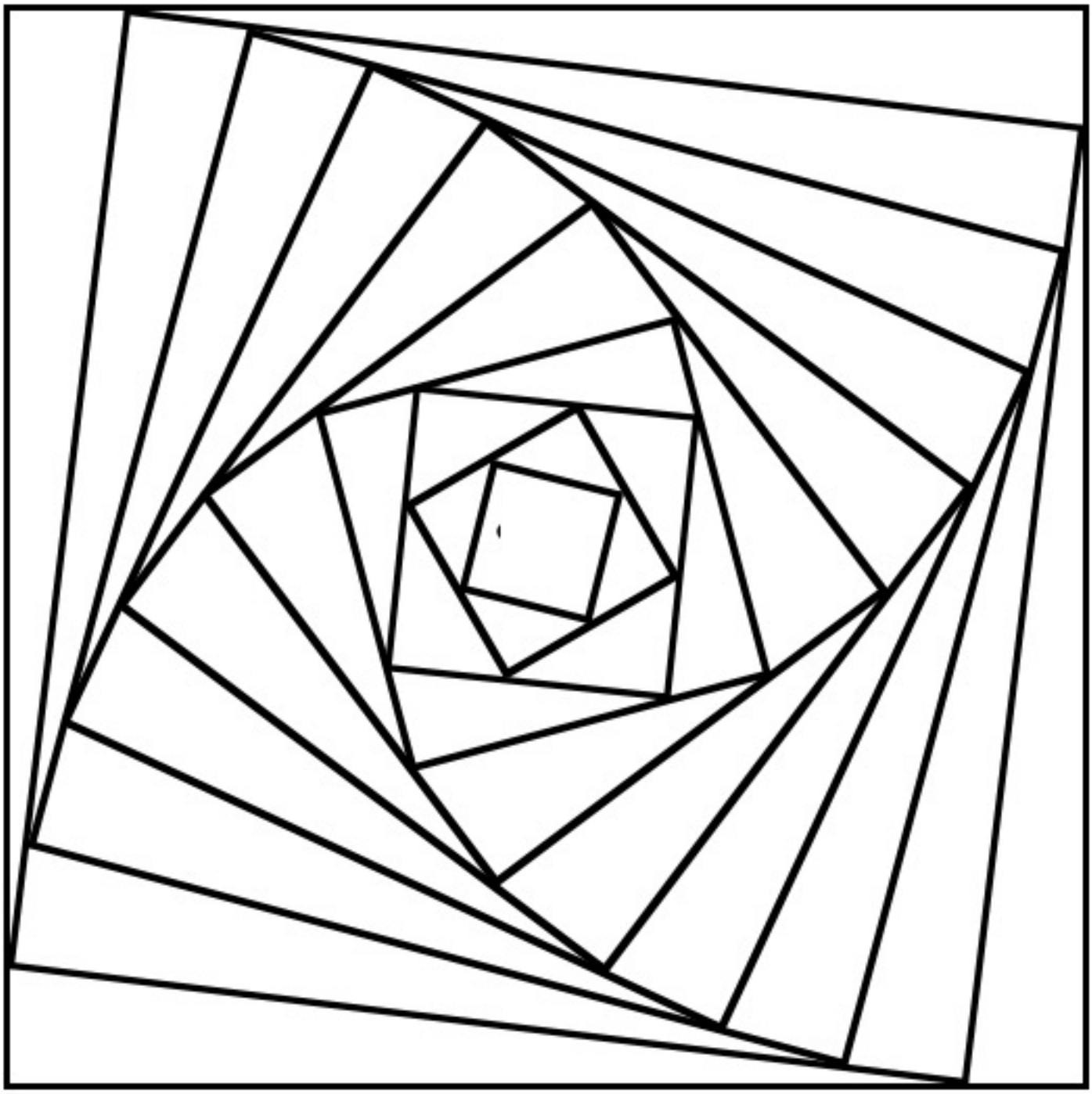

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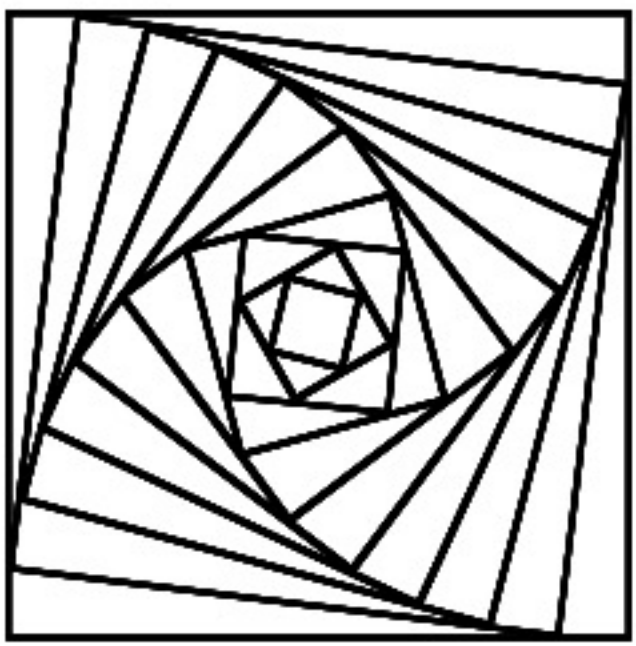

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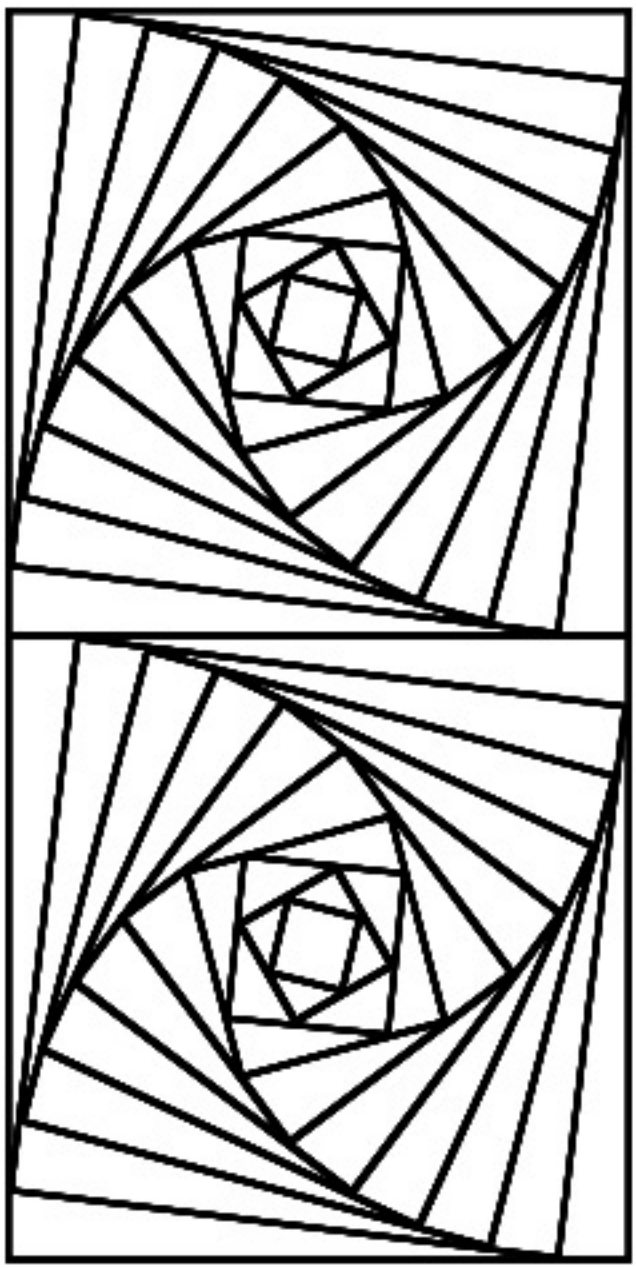

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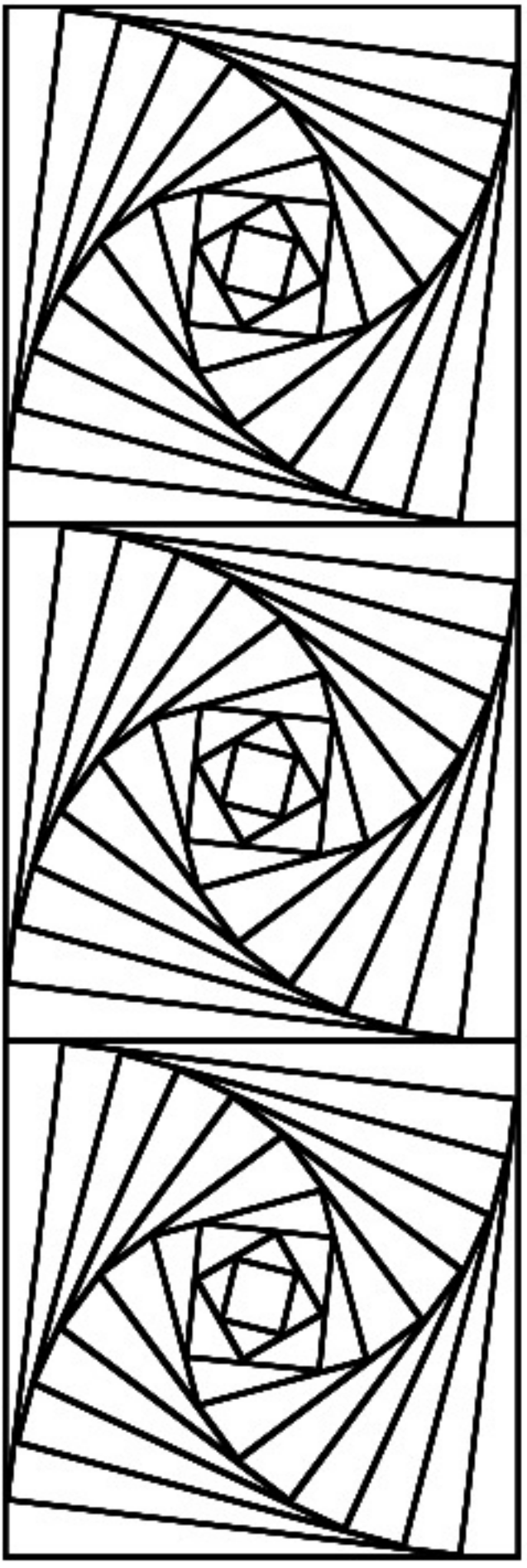

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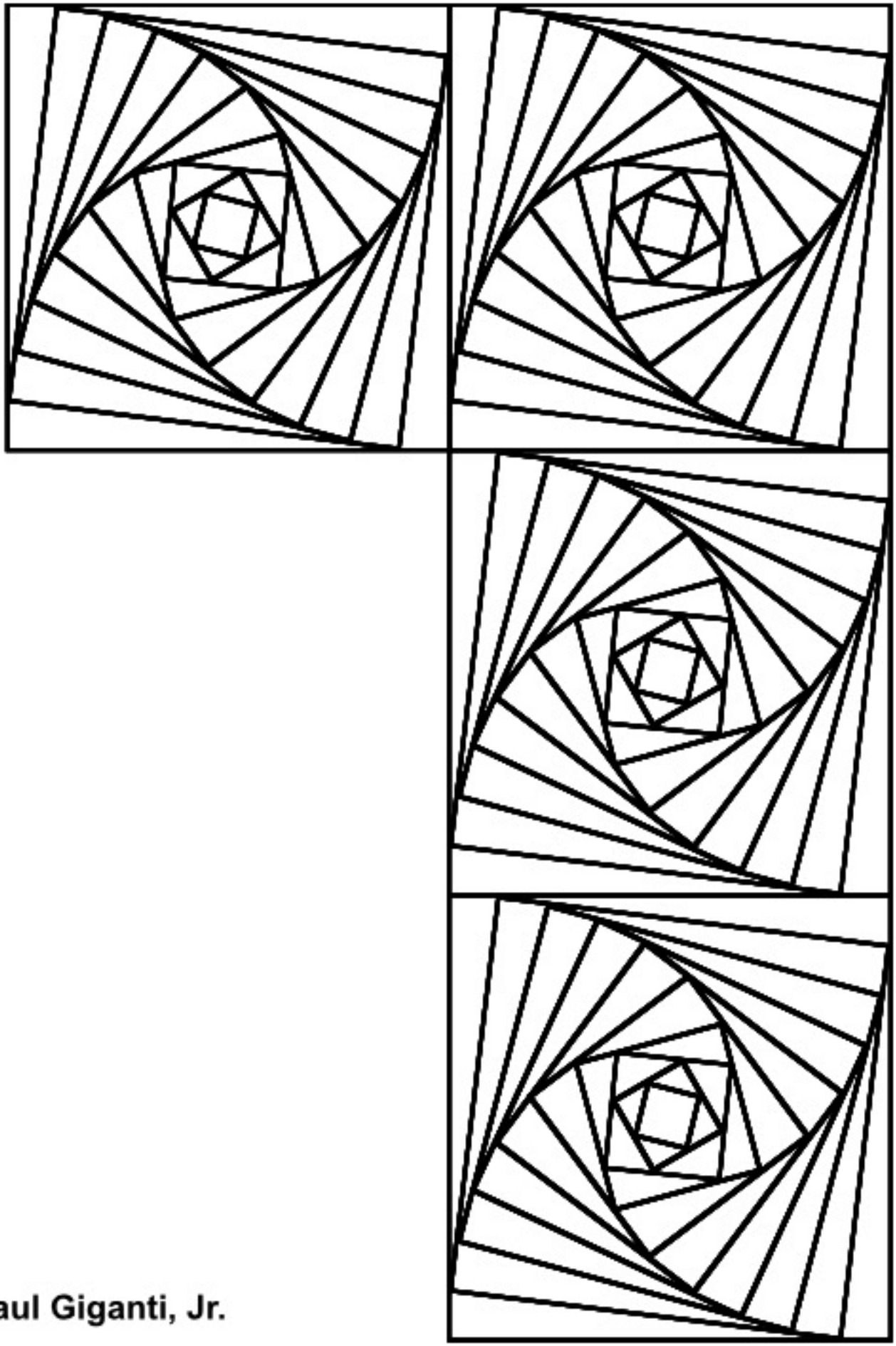

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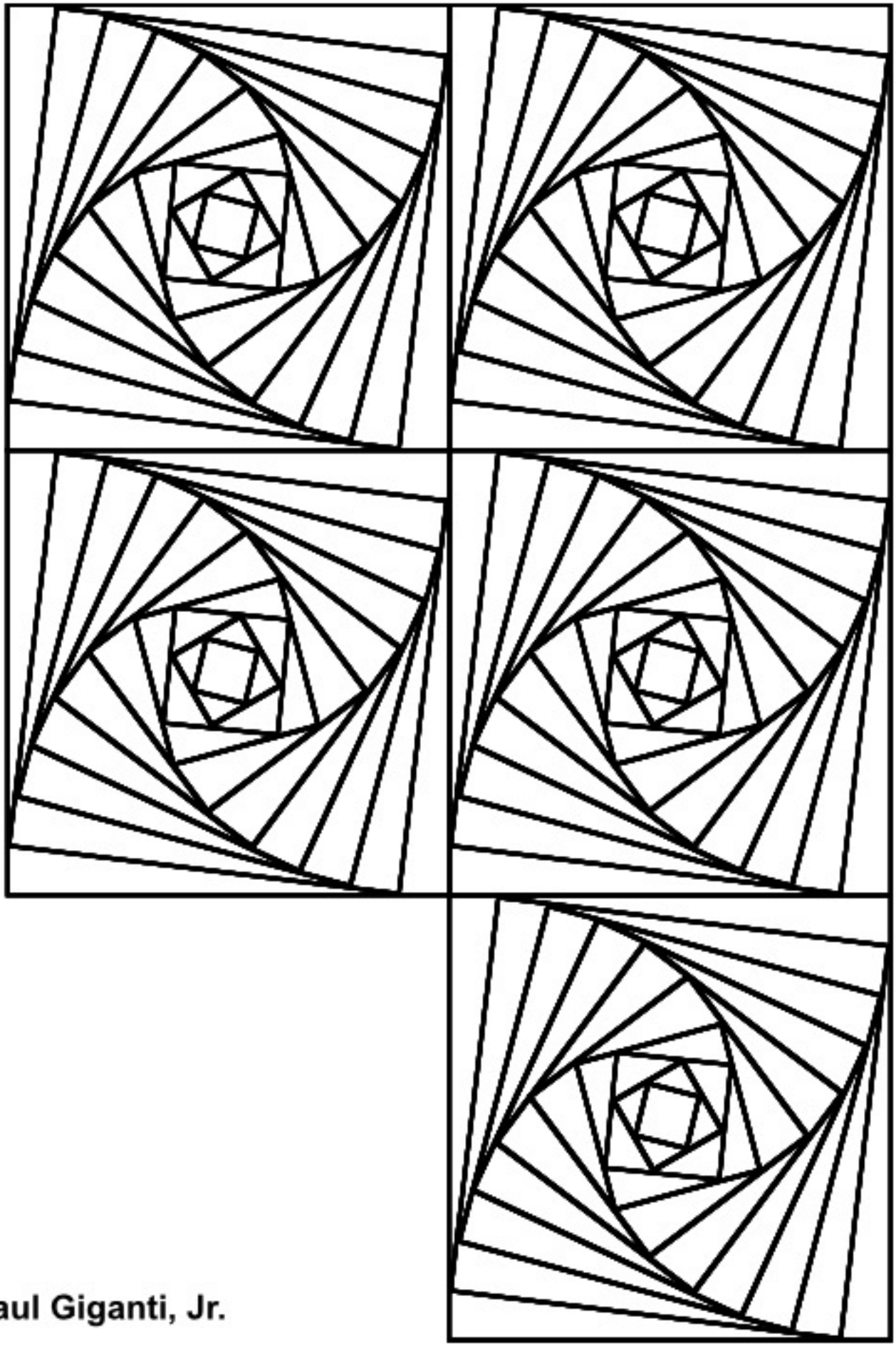

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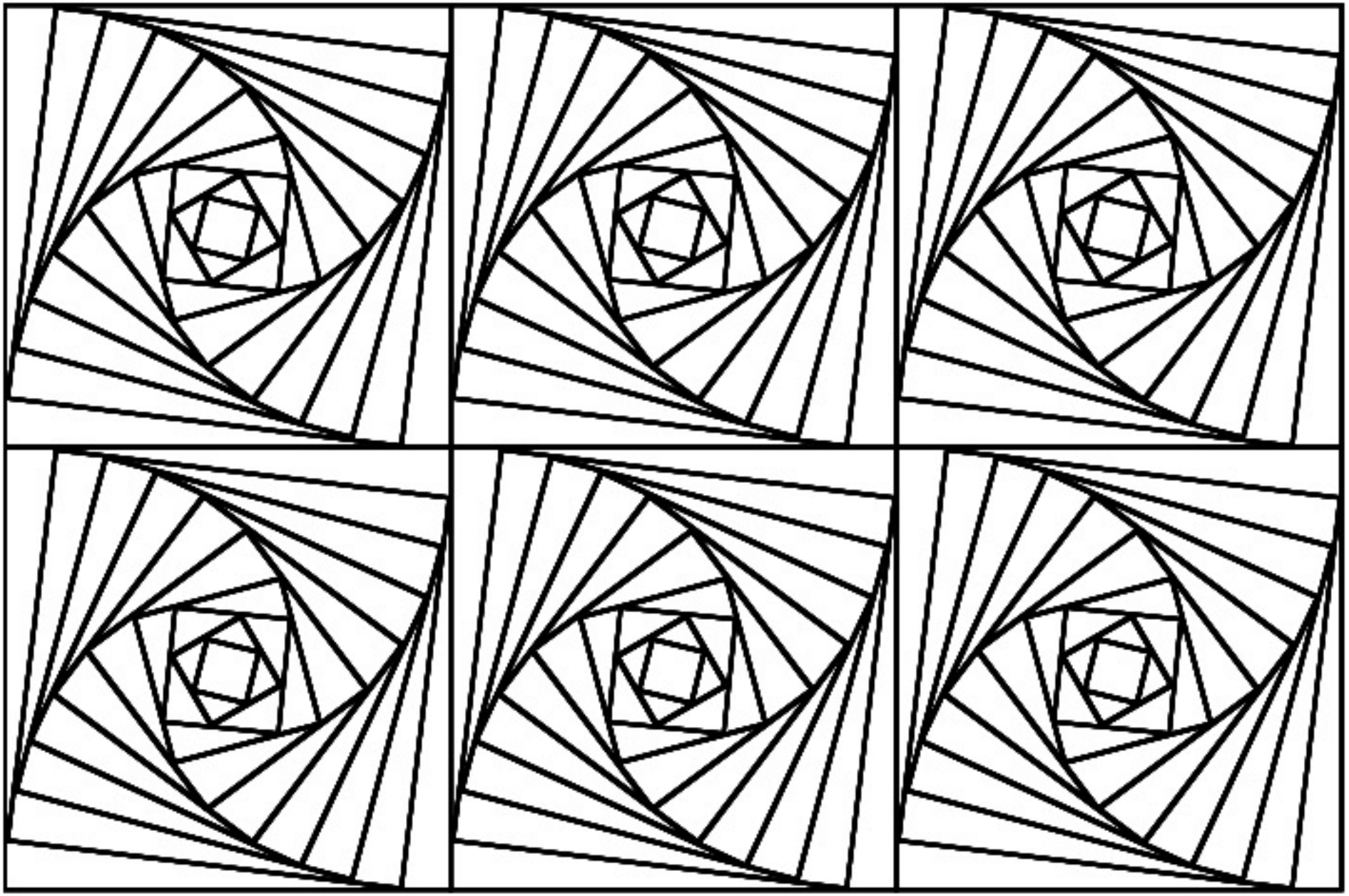

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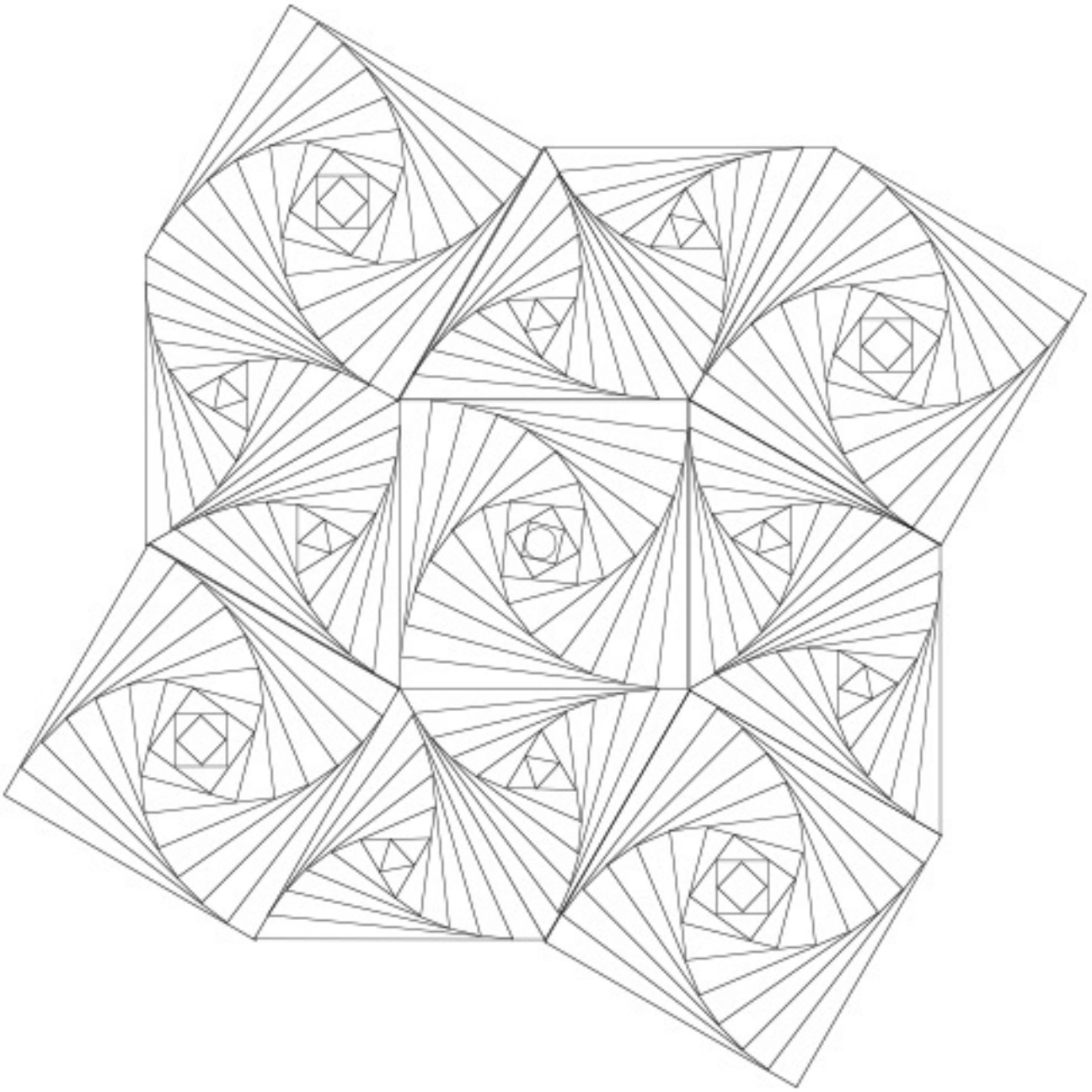

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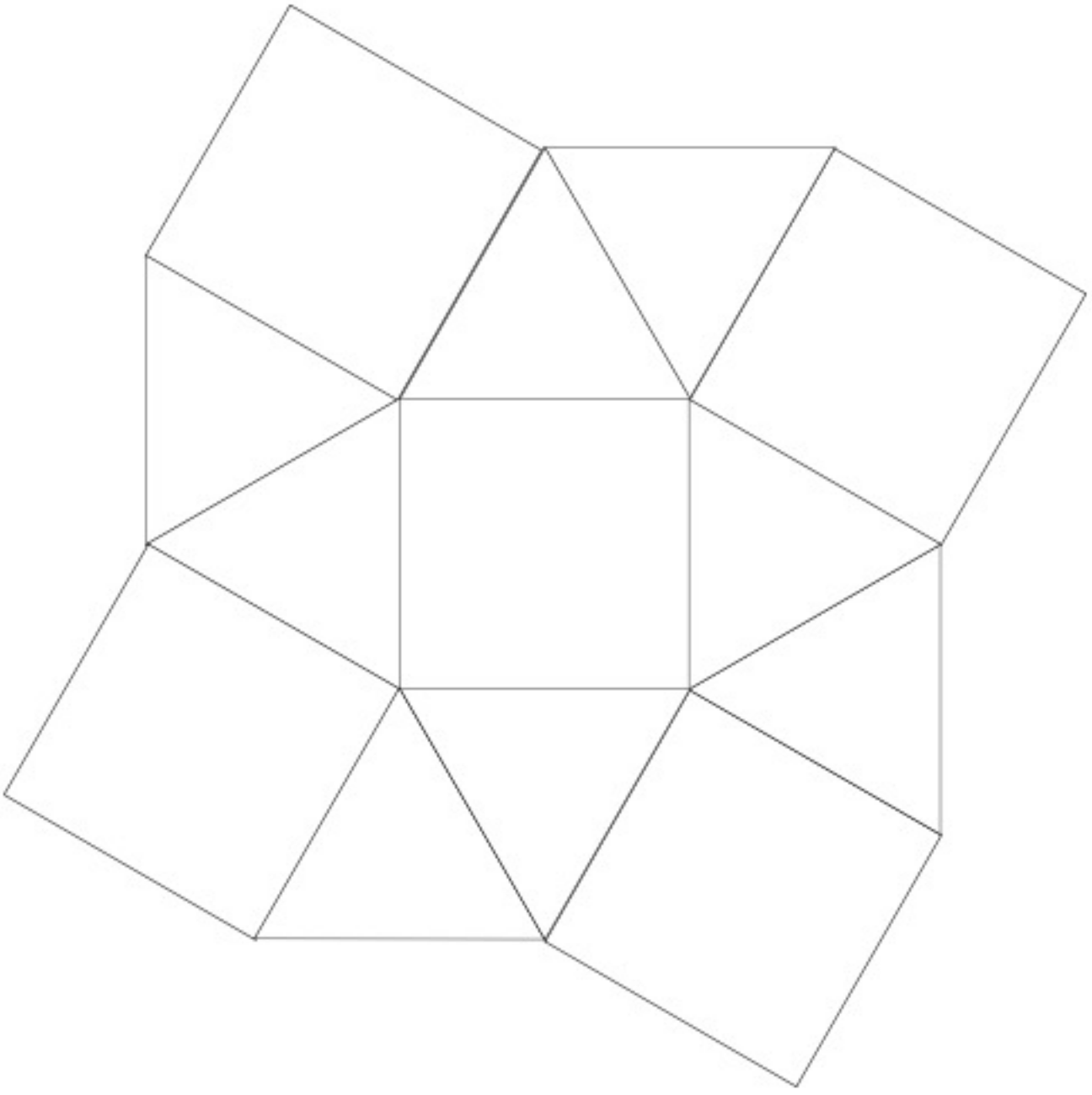

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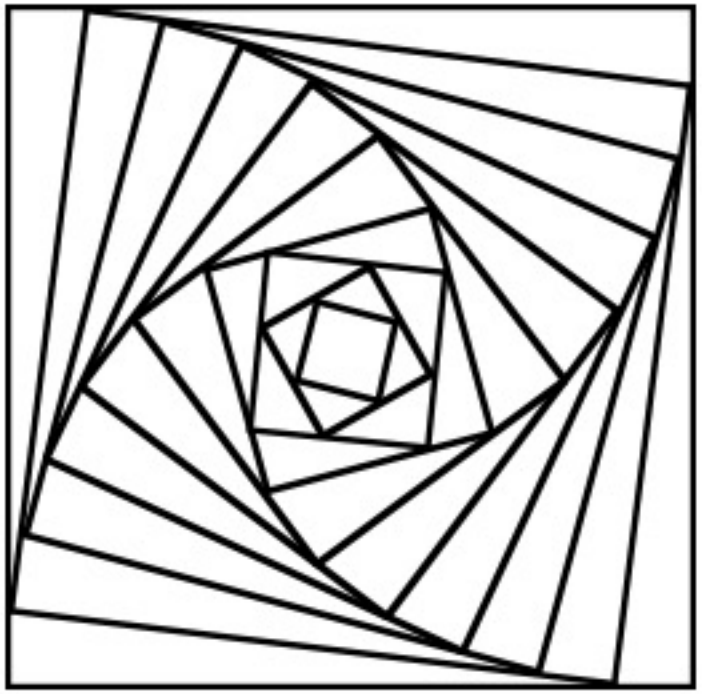

Directions…

- Start with a square
- Always maintain a clockwise direction
- Measure one unit from each corner and mark
- Using those marks, draw a new square
- Measure one unit from each corner of the new square…and so on.

* Remember; make four marks, then make four lines, over and over and over…

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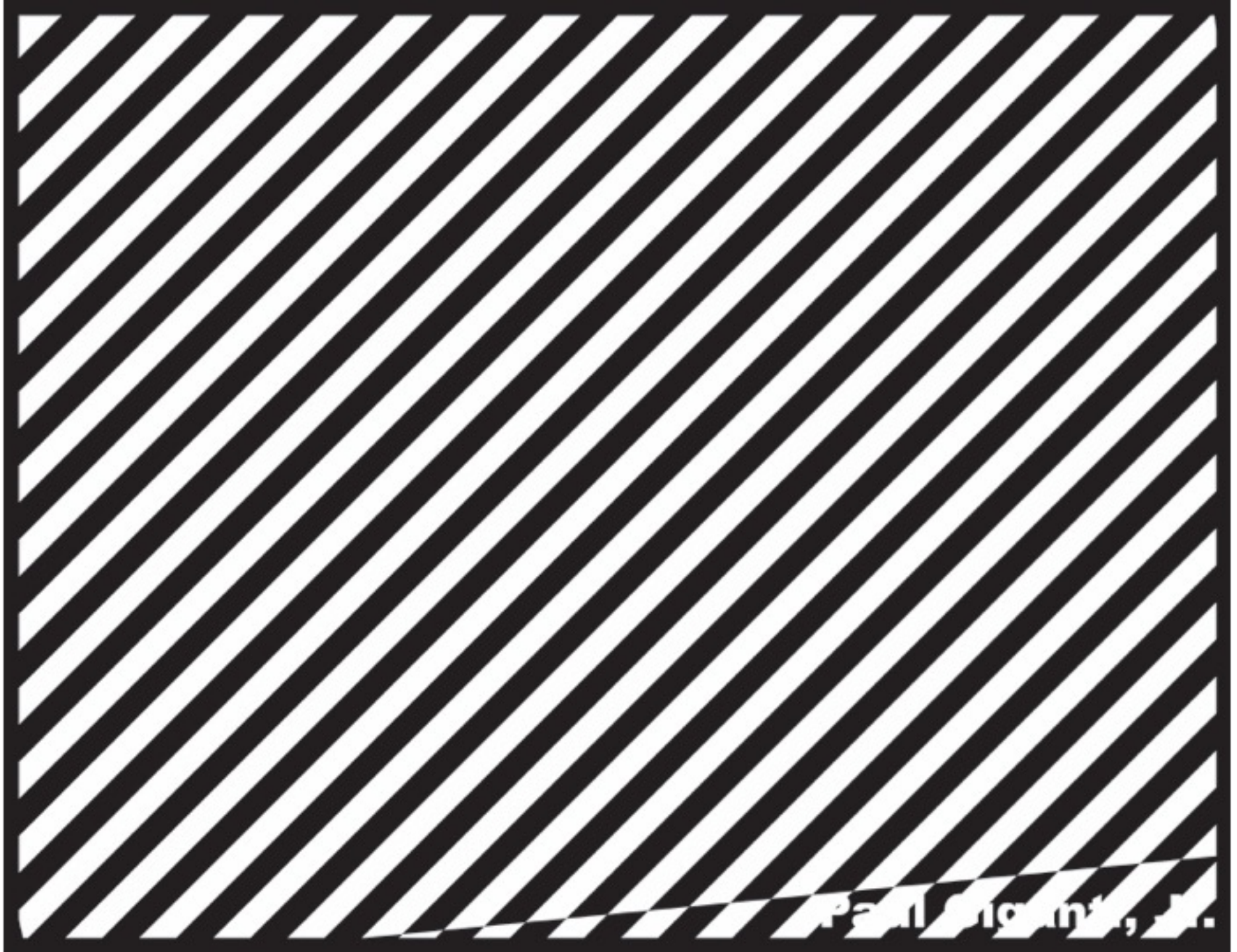
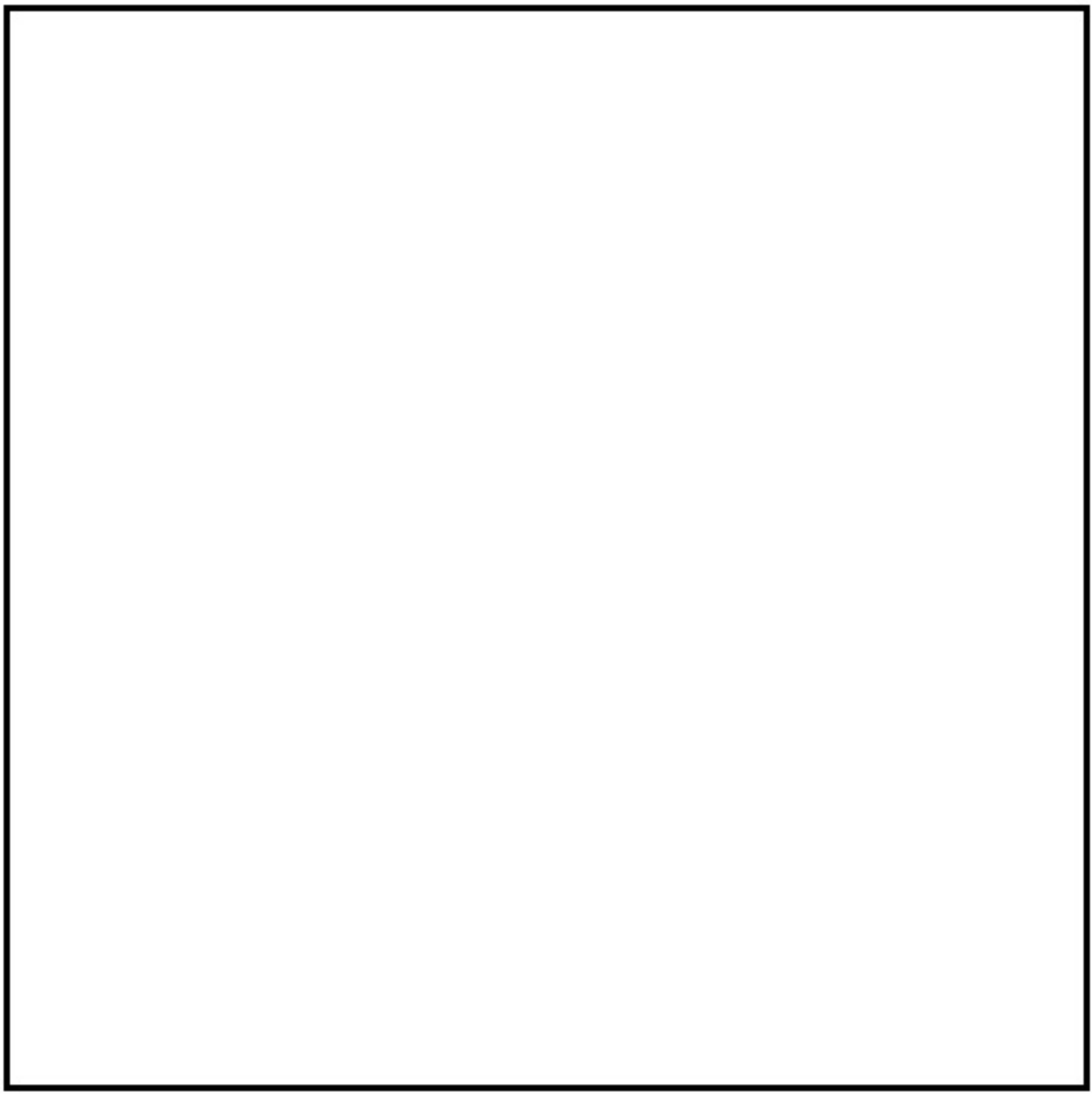


CURVE STITCHING



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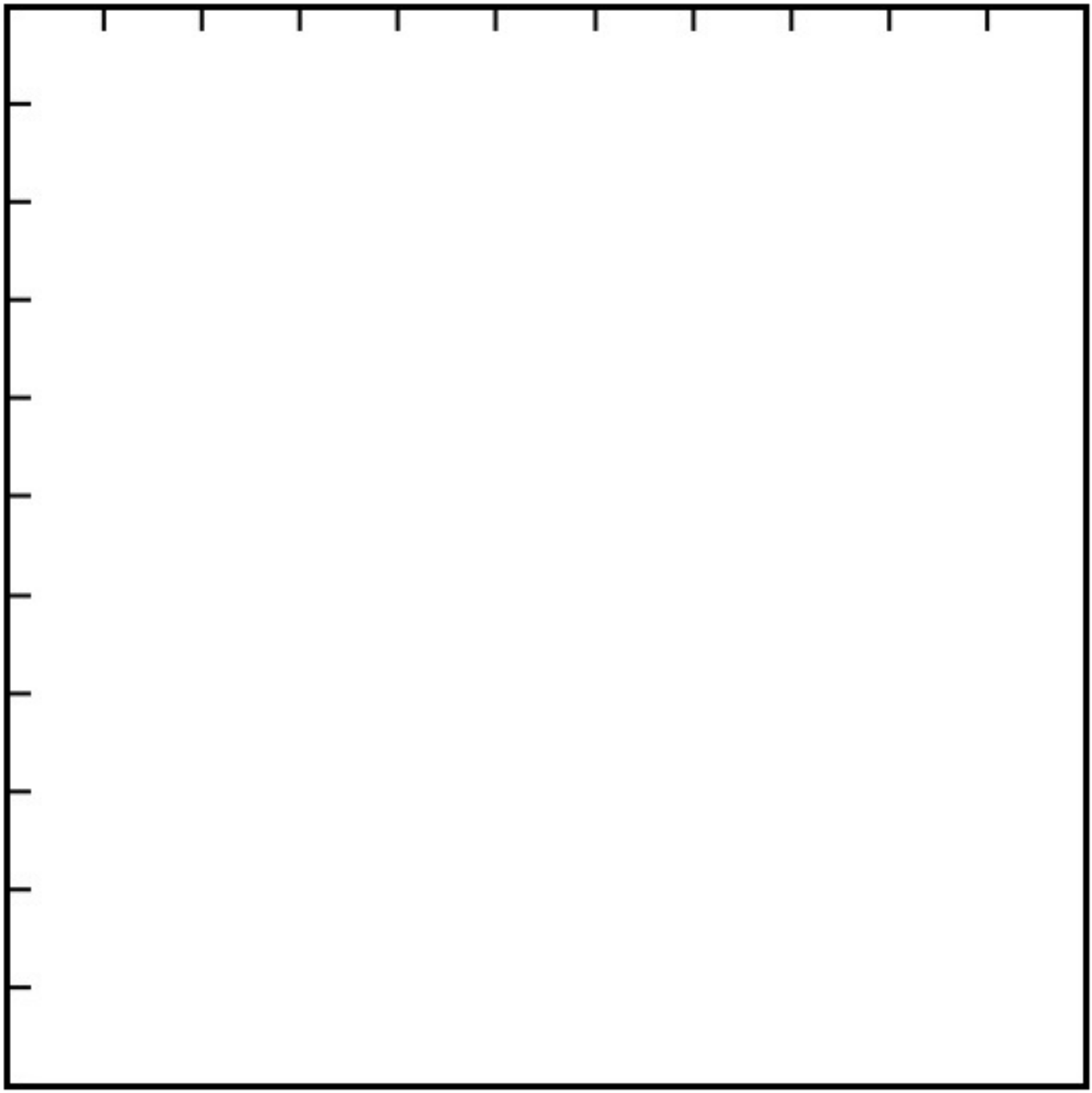

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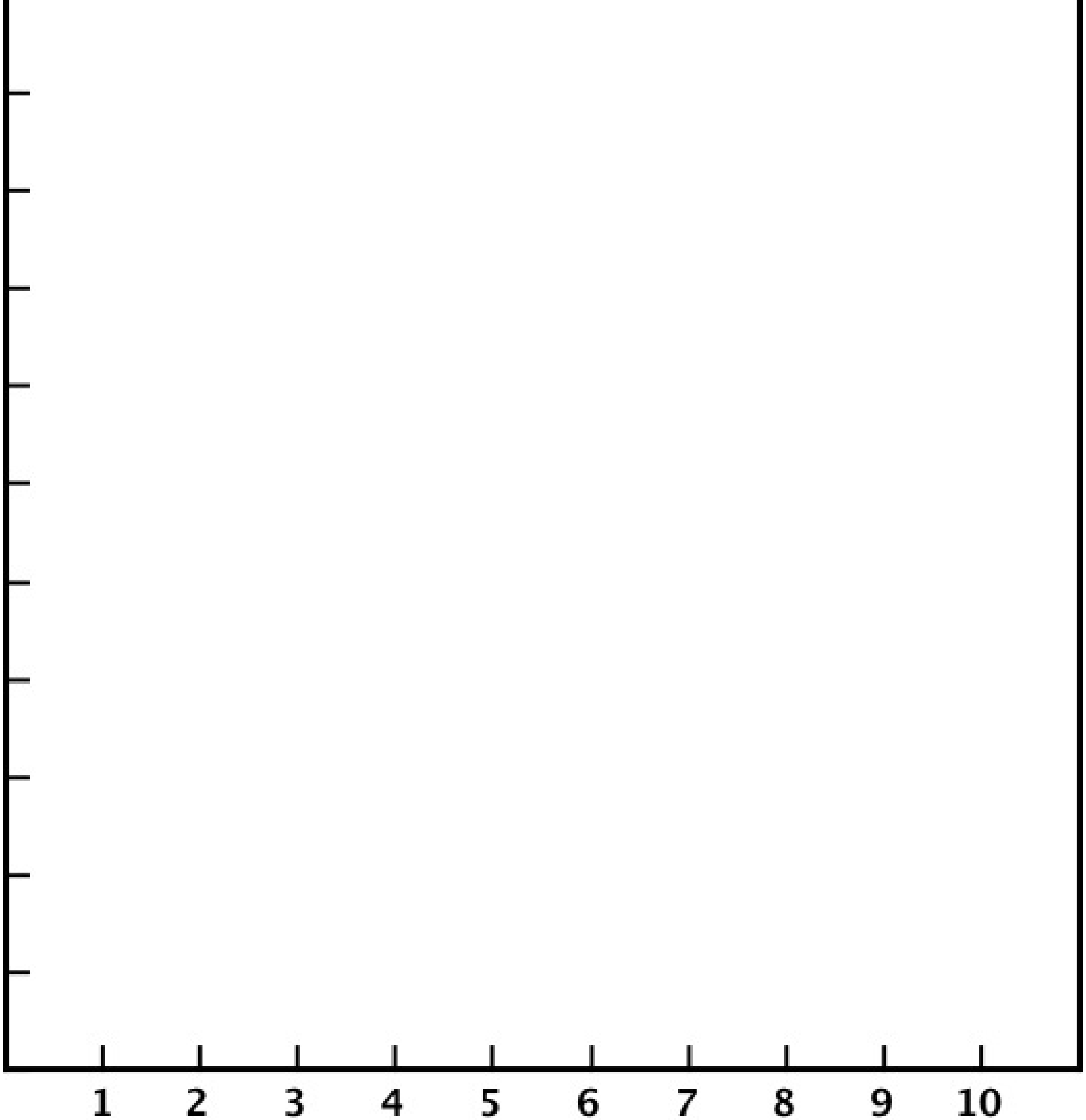

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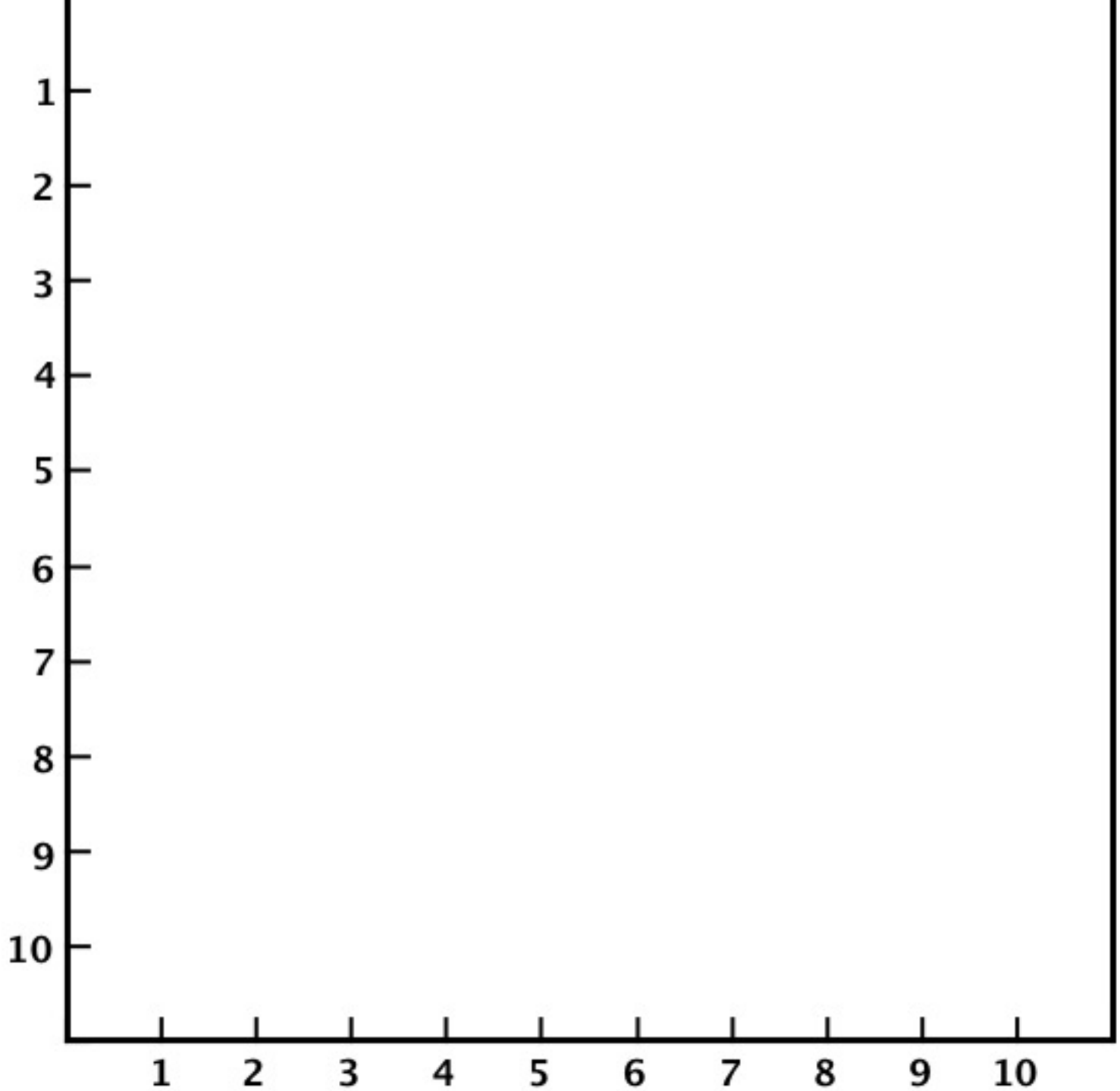

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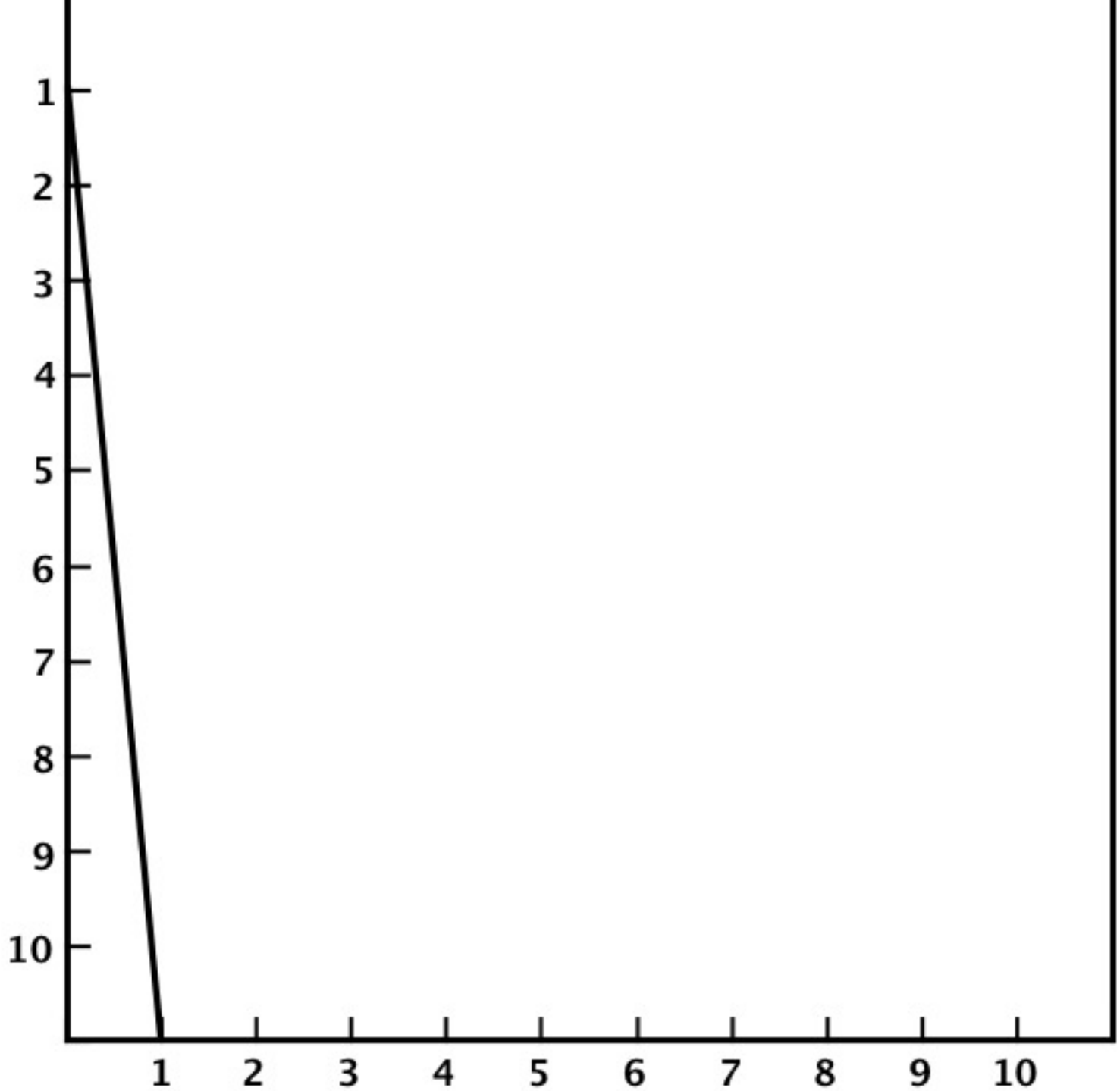

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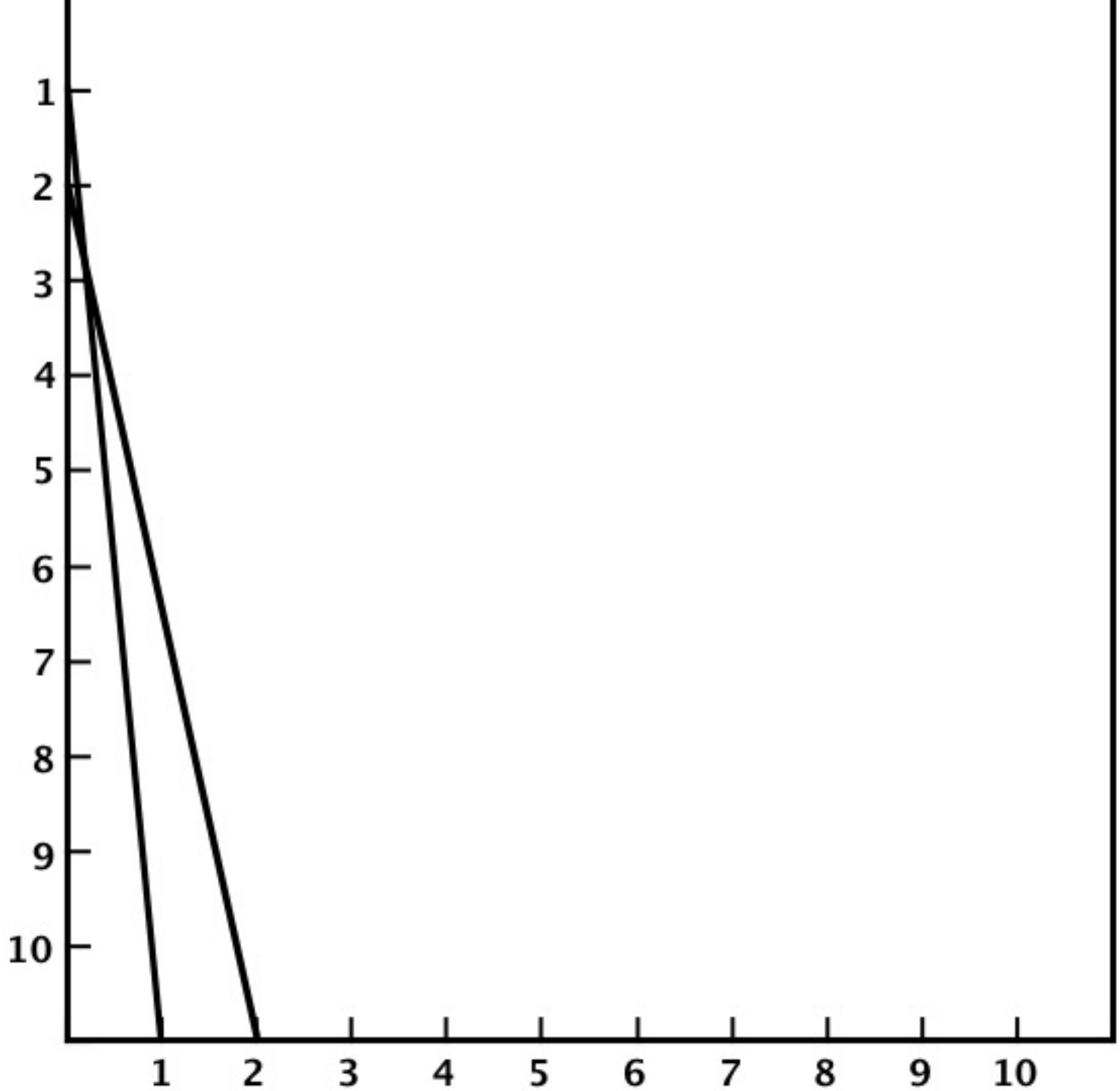

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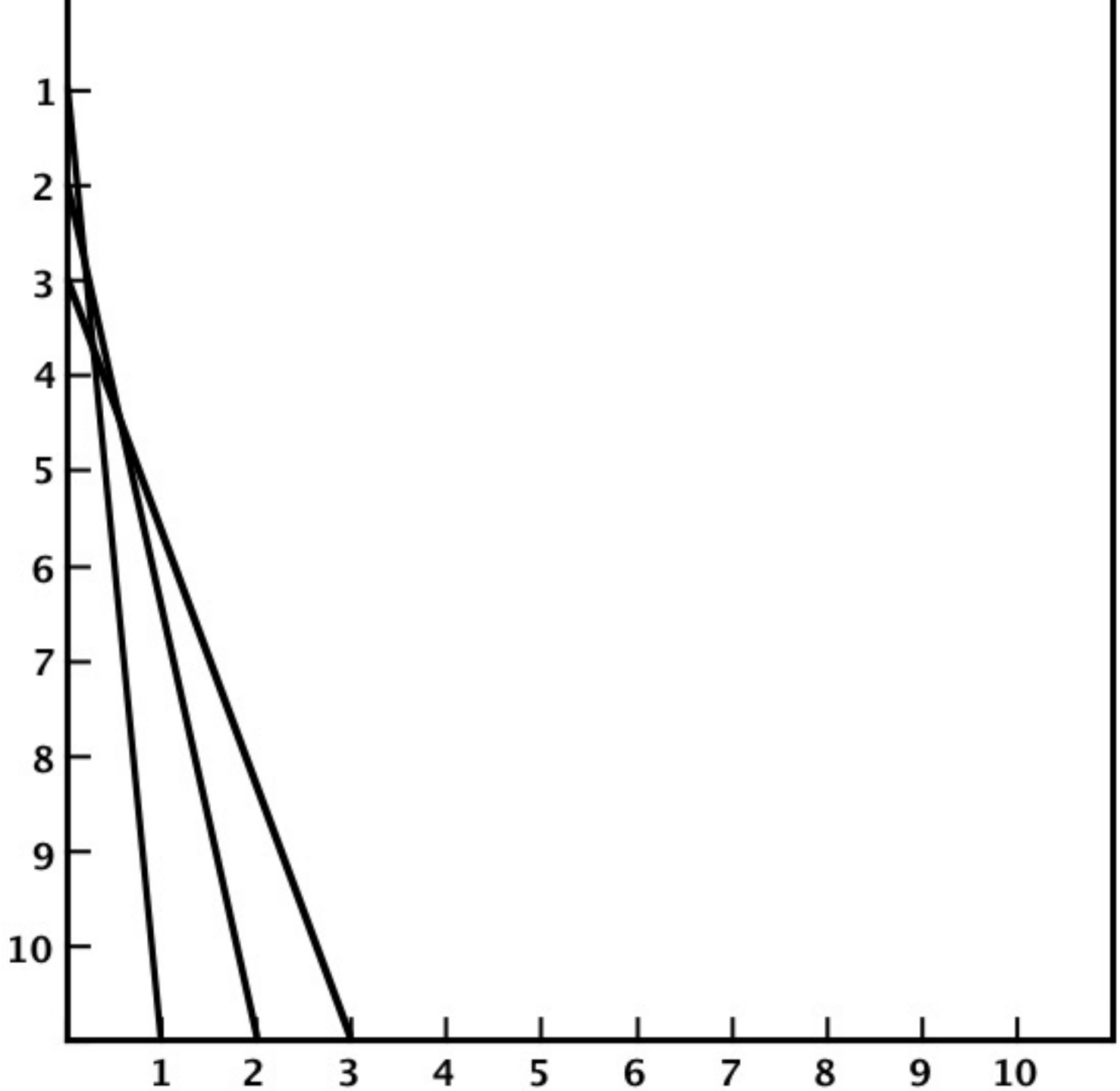

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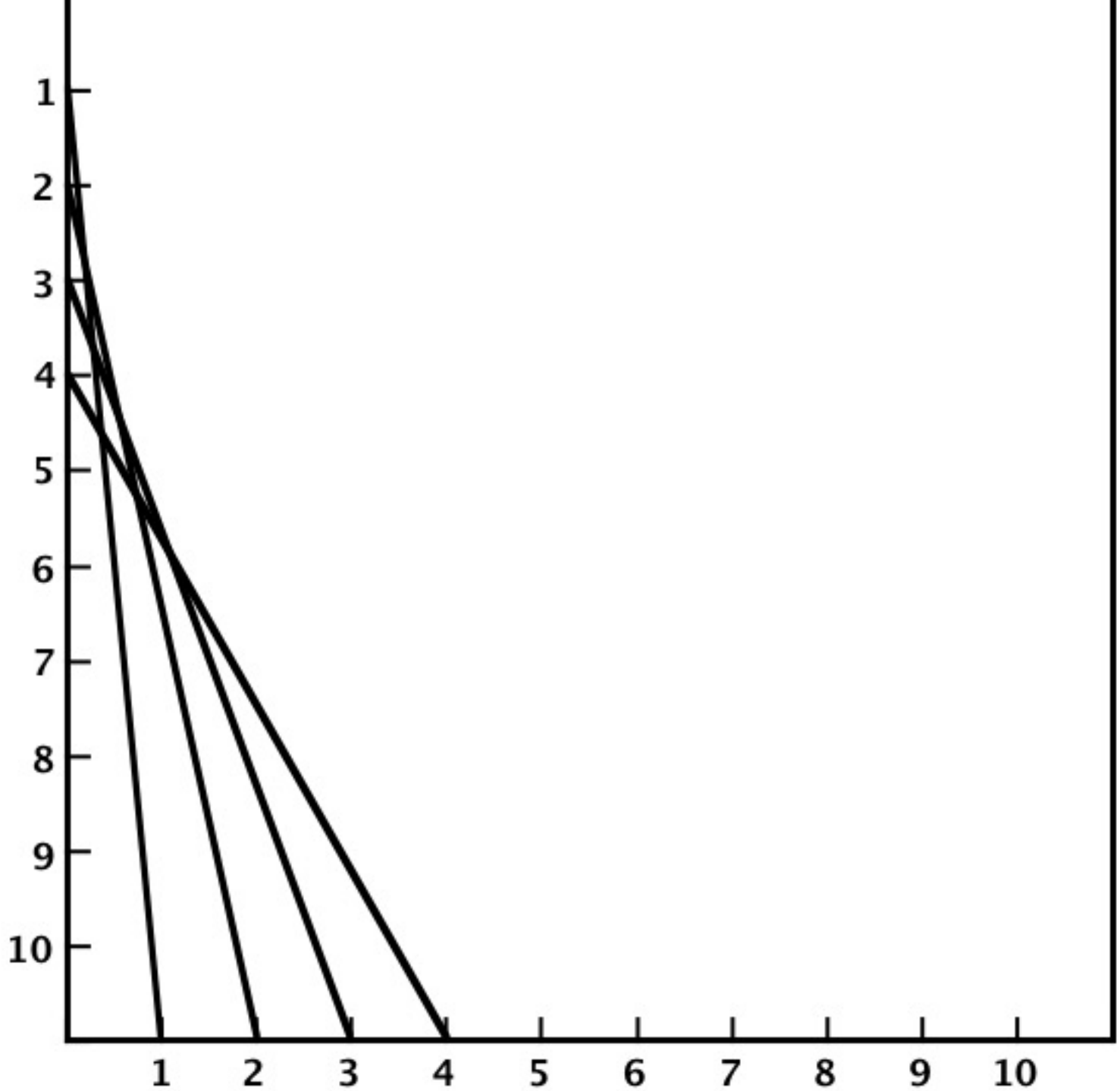

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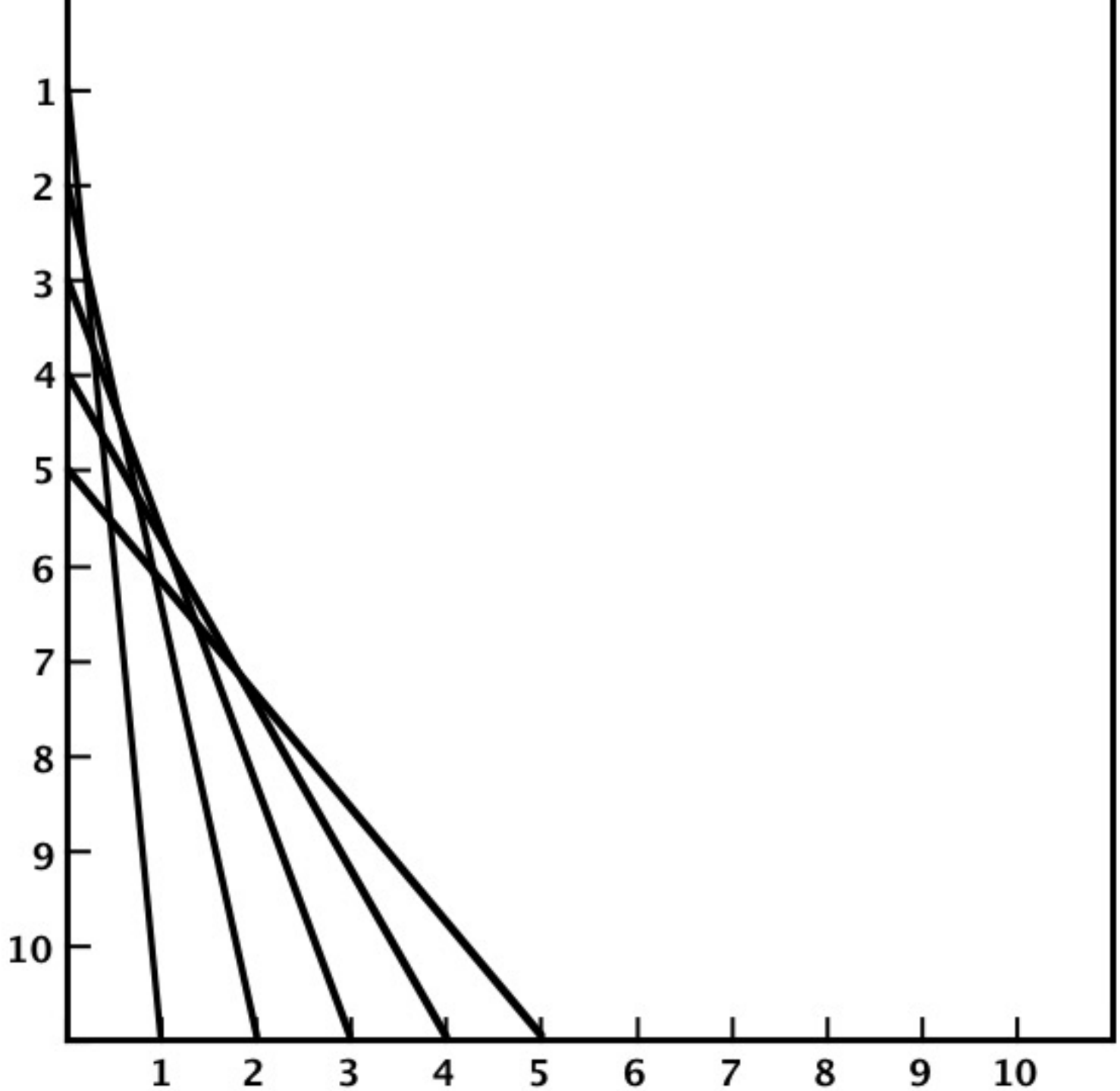

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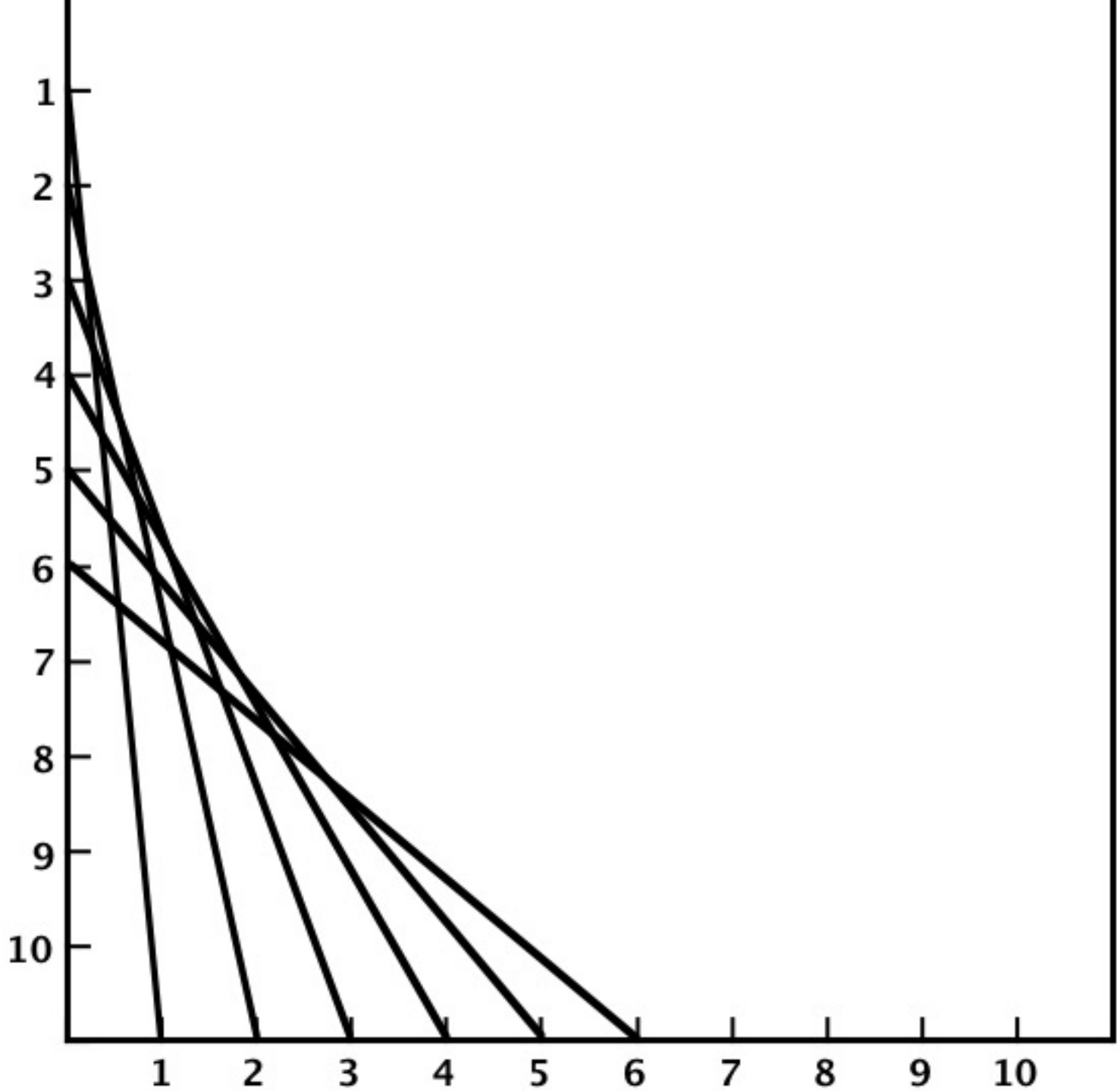

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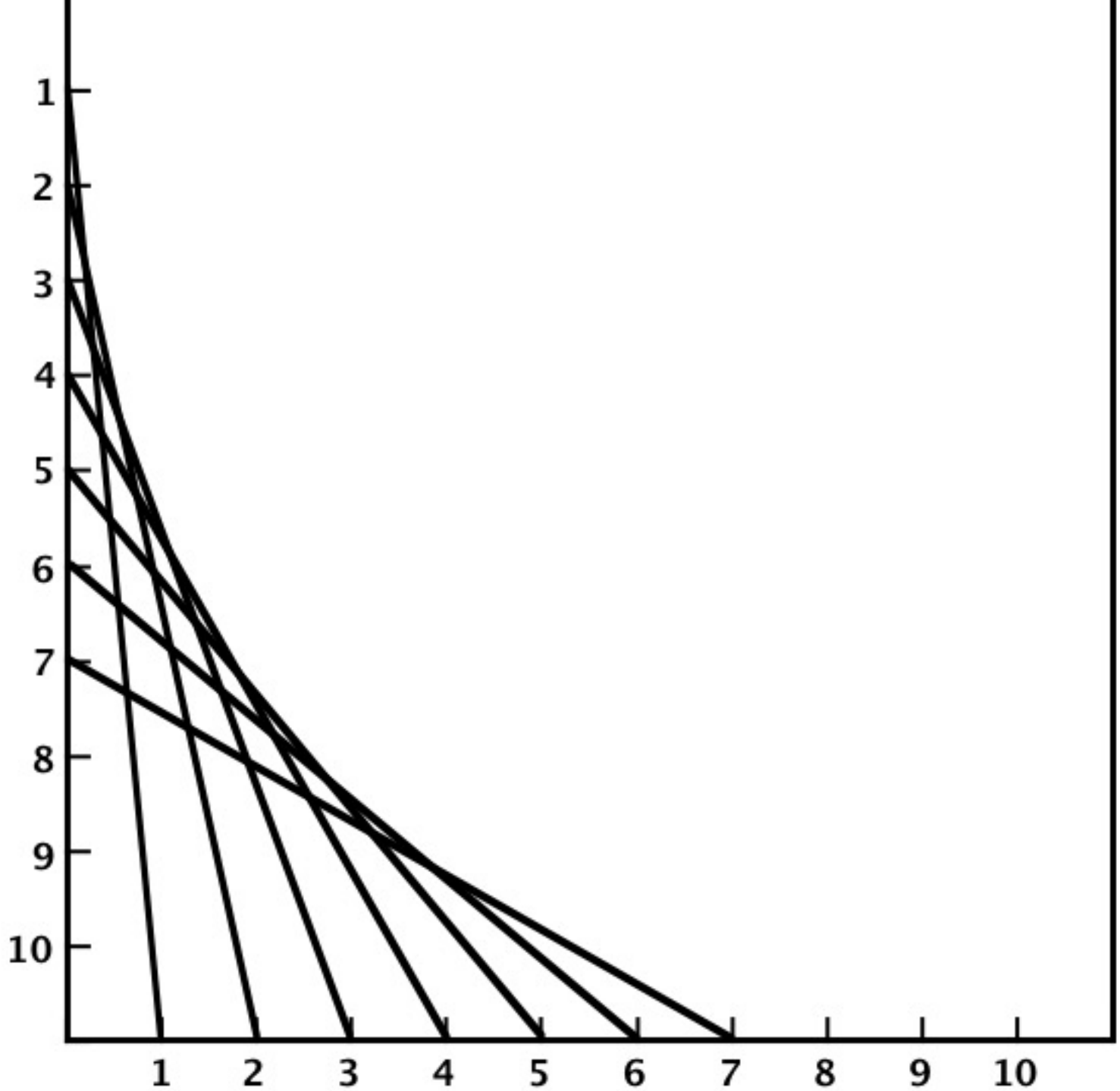

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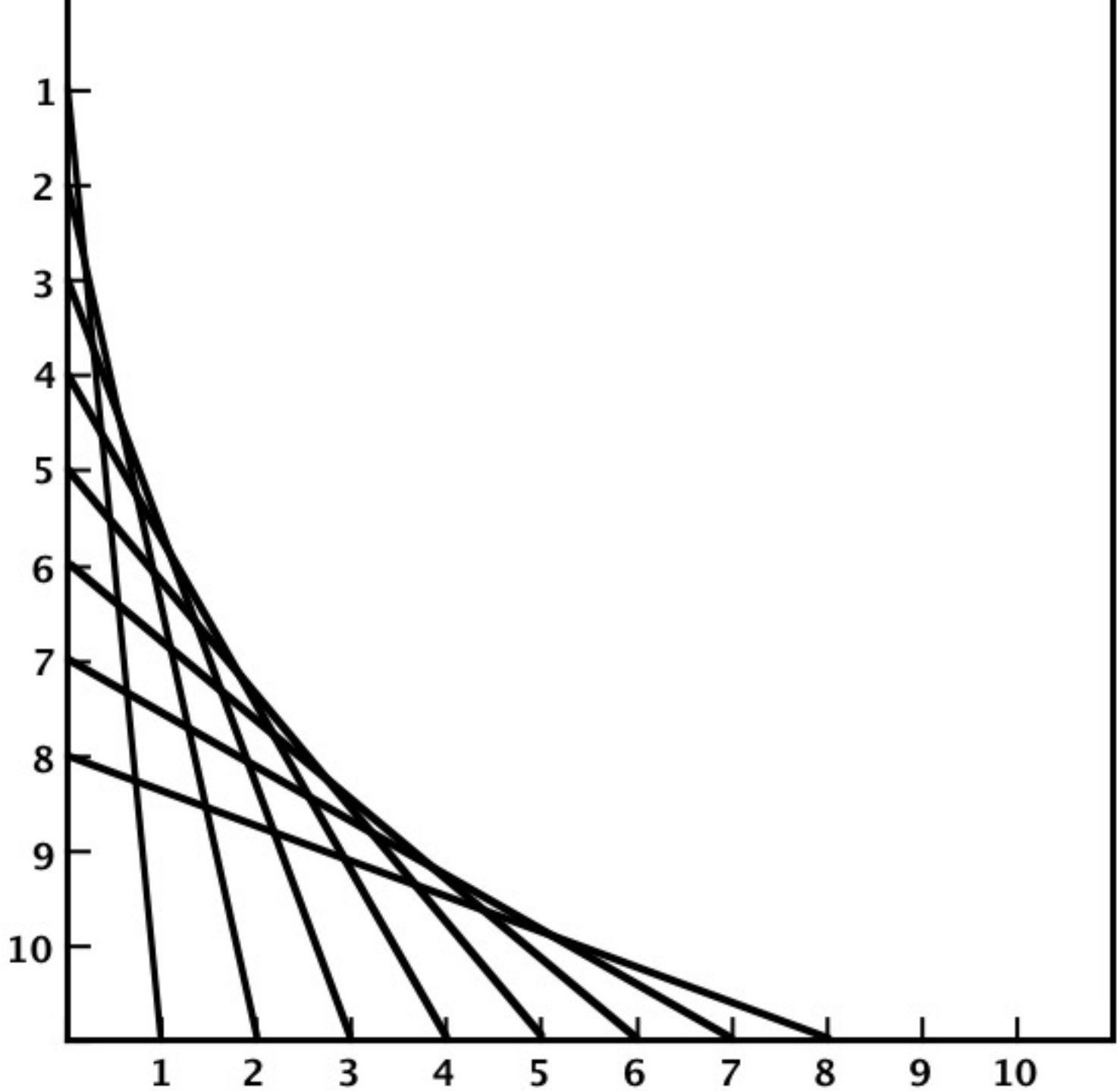

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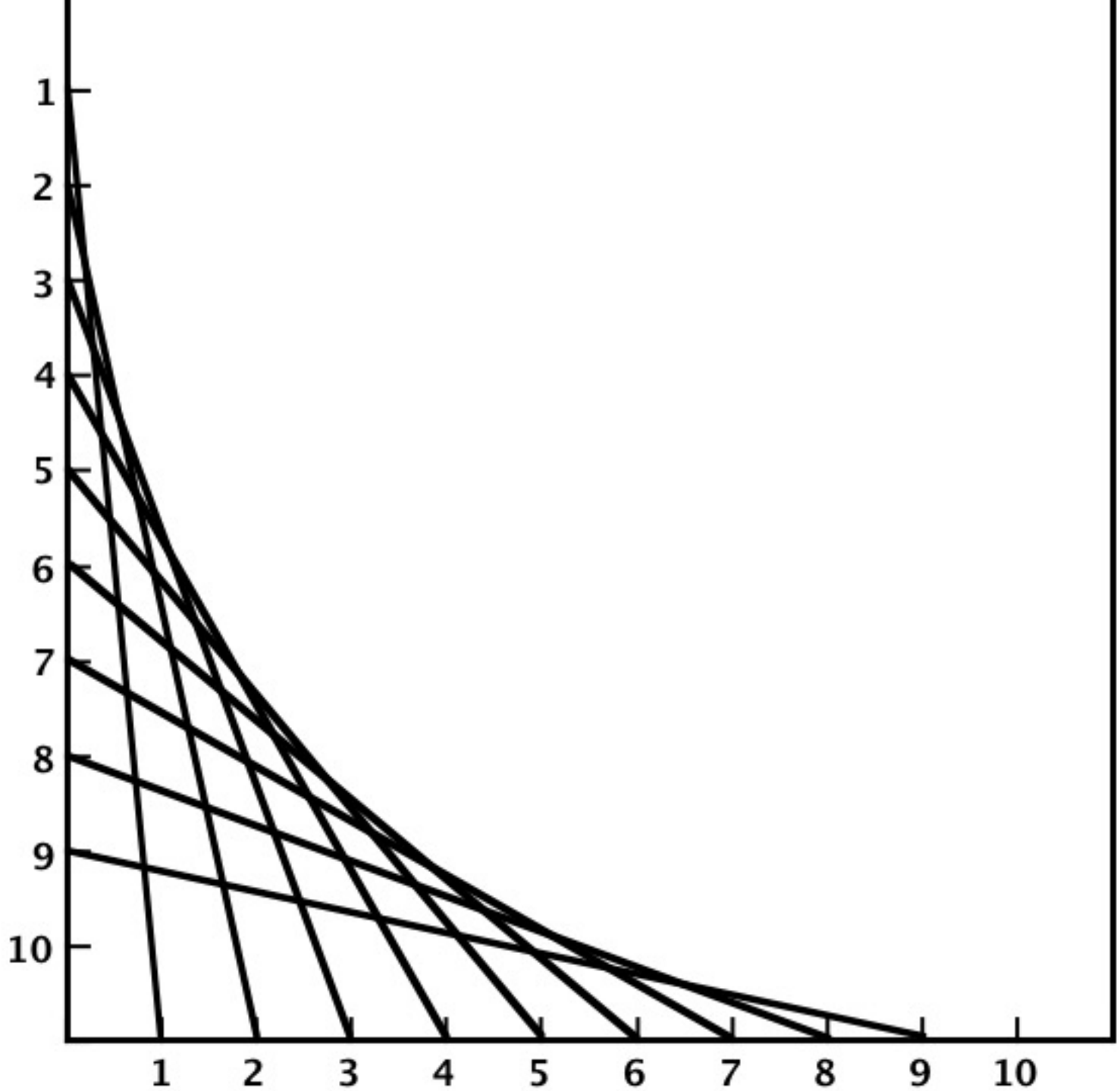

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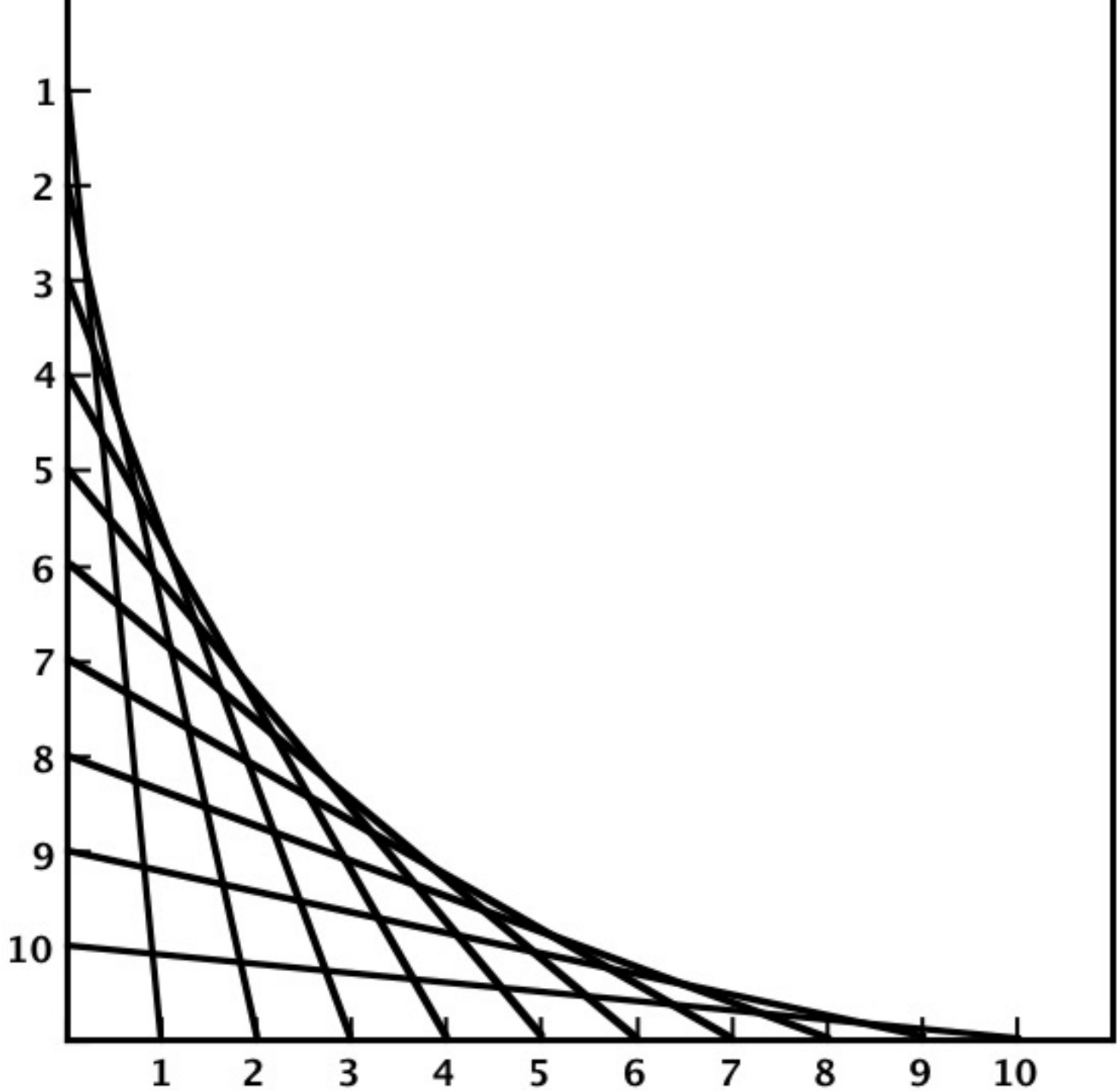

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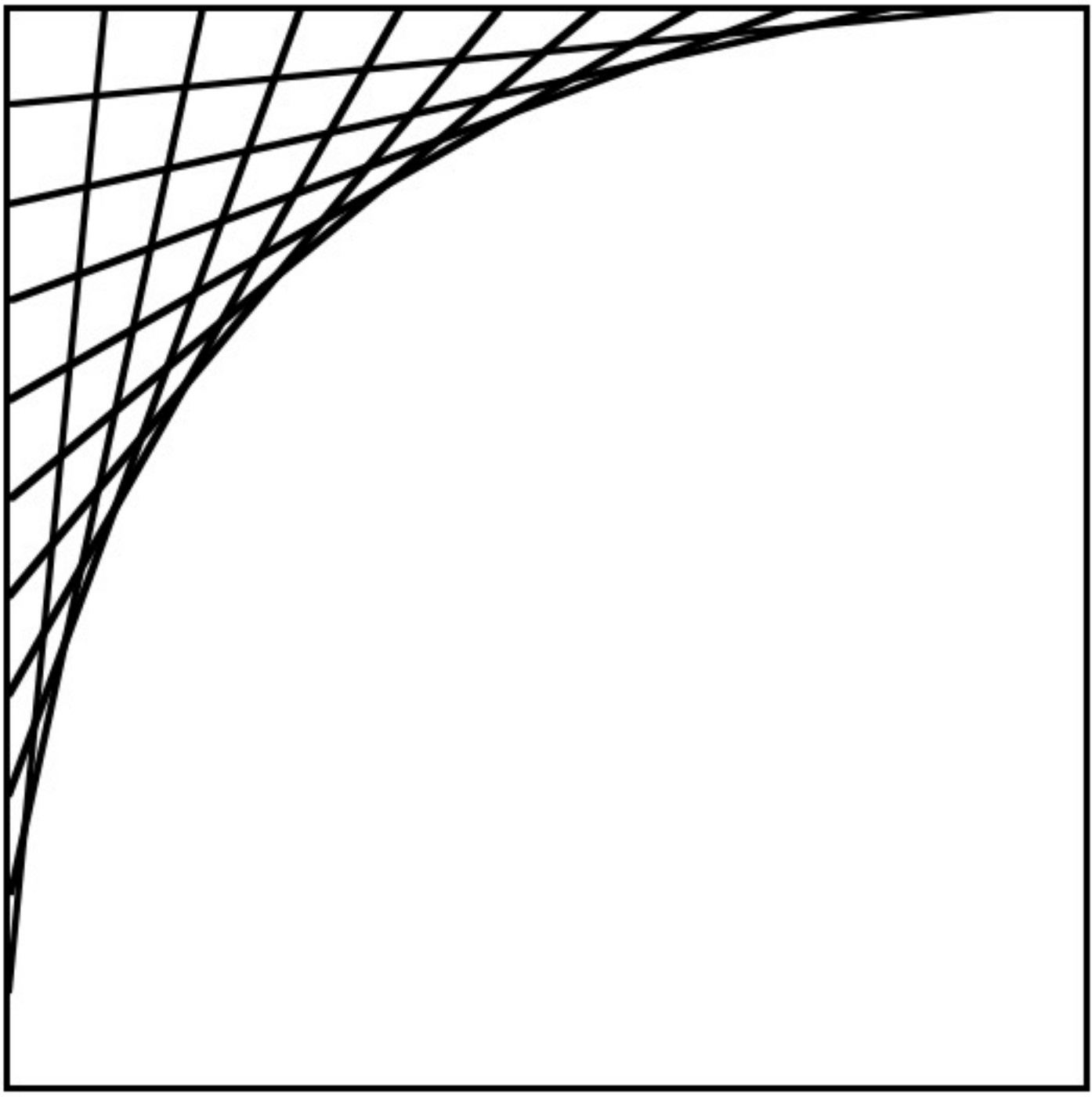

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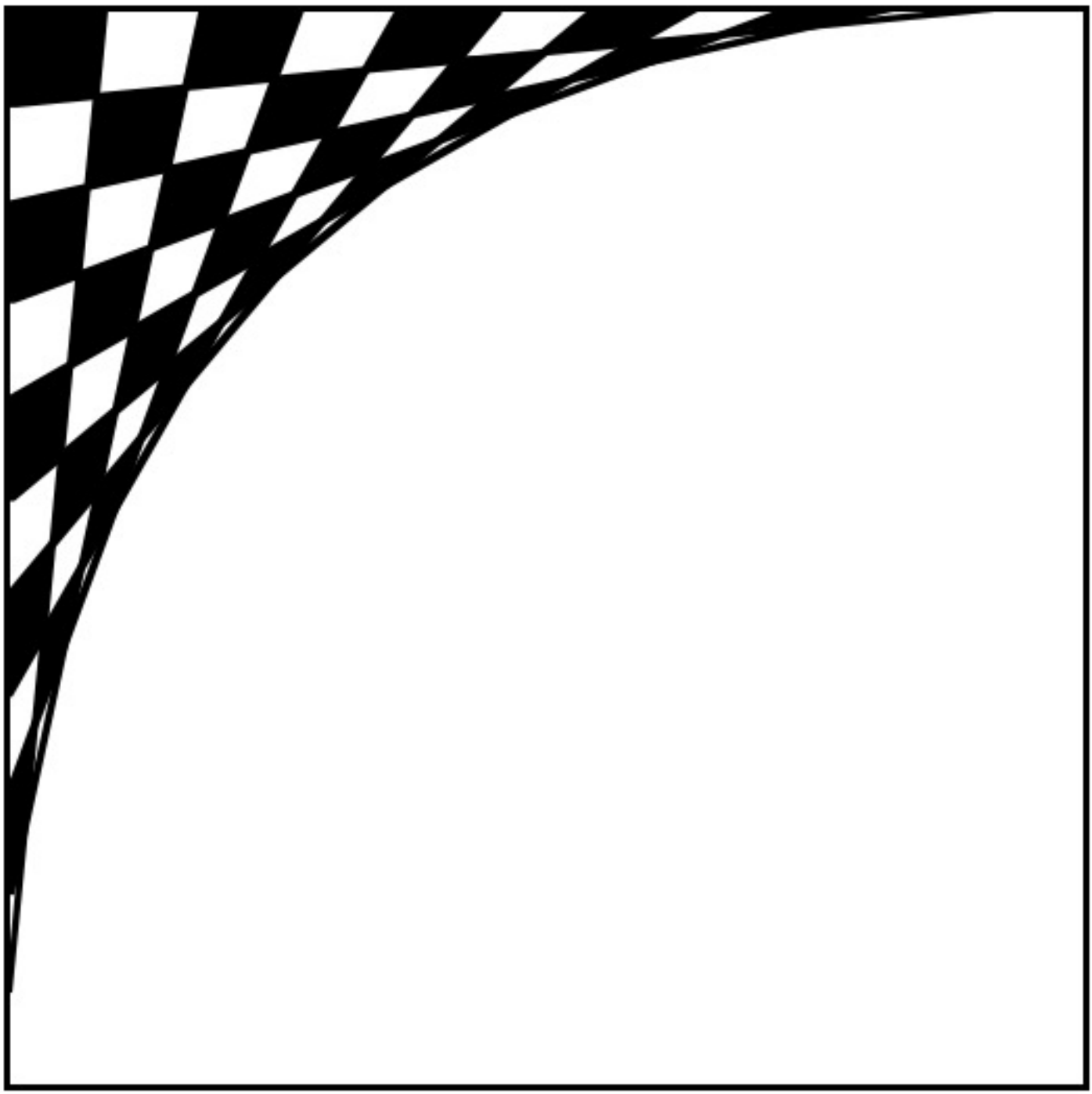

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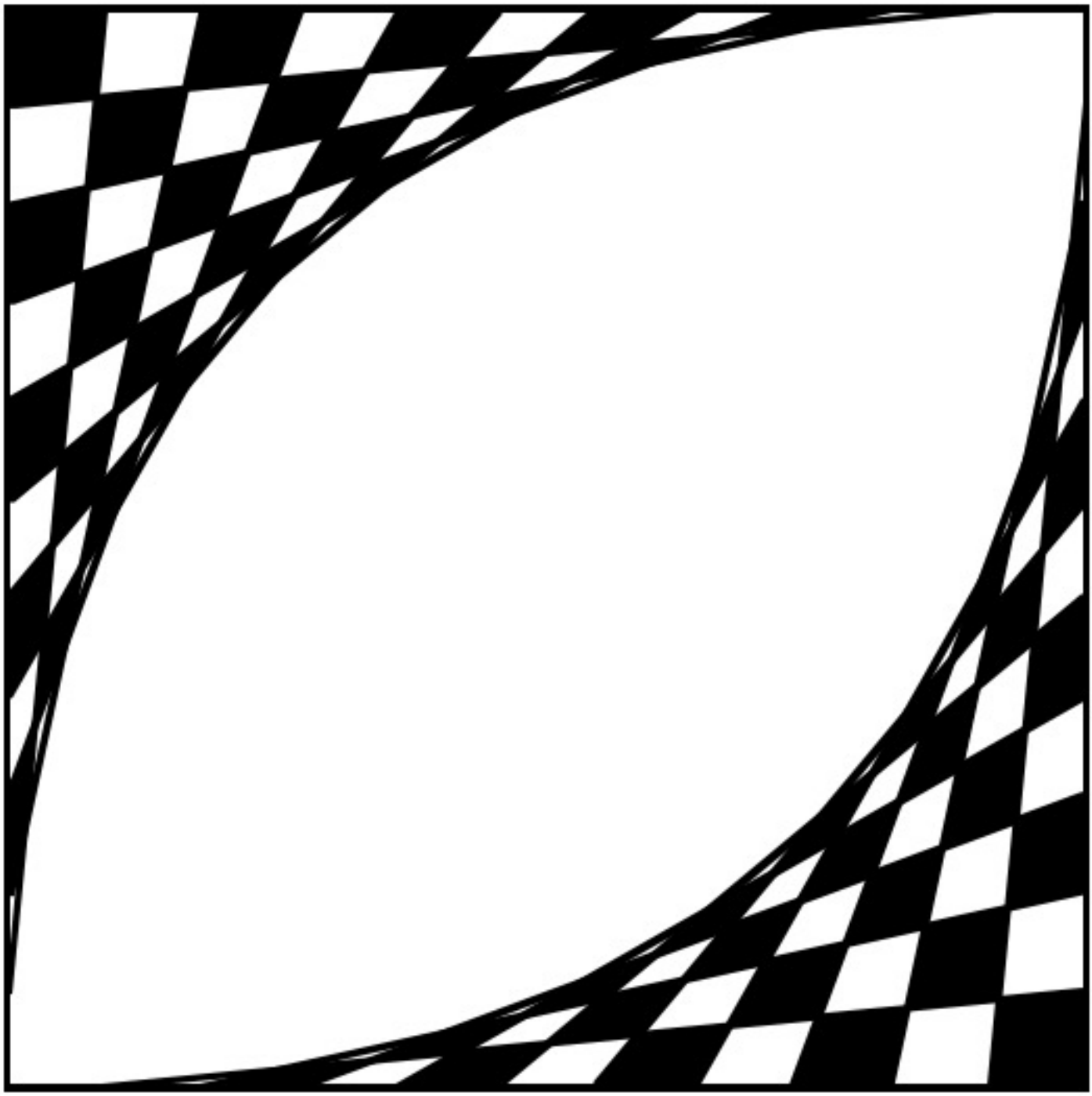

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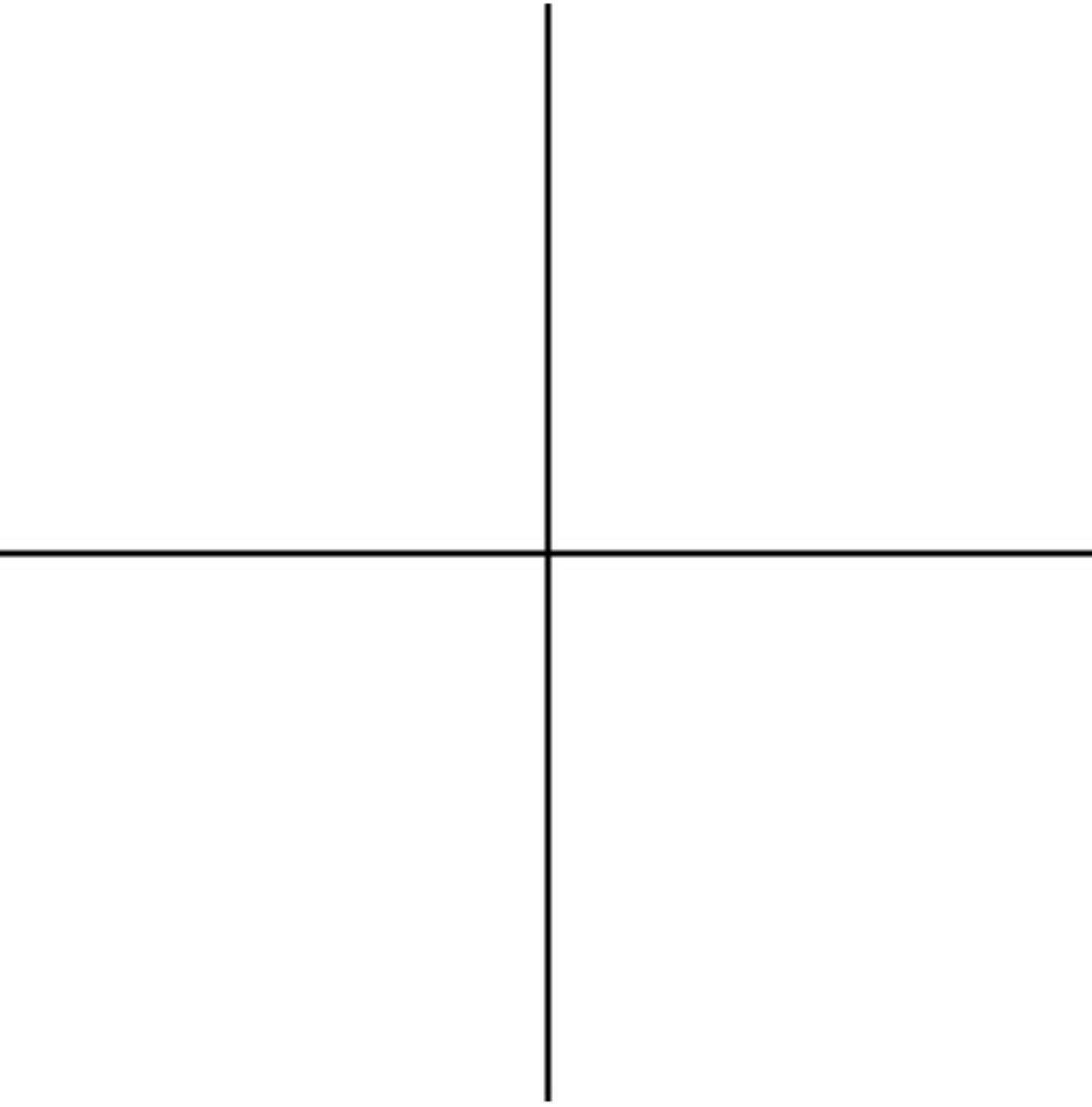

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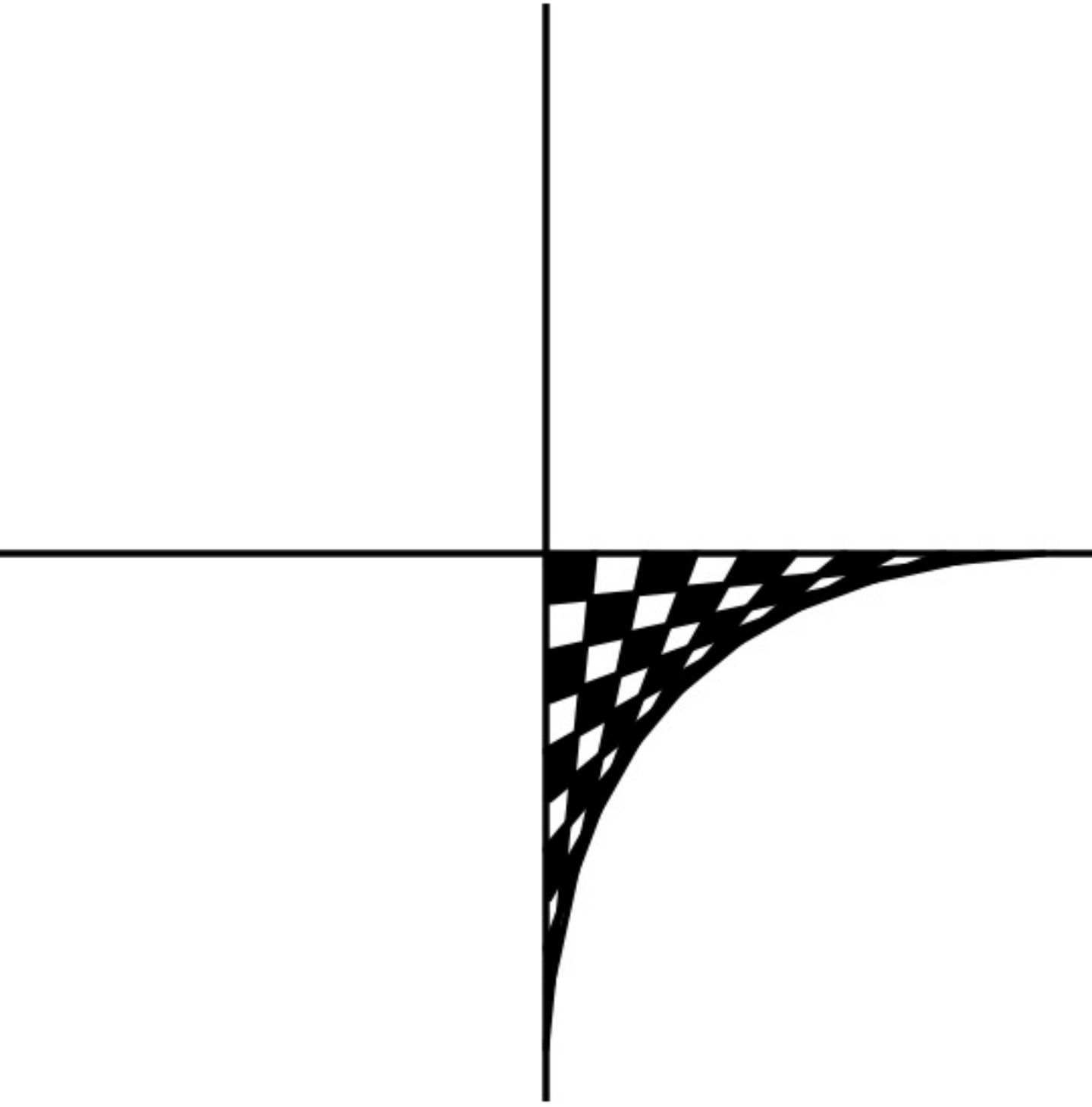

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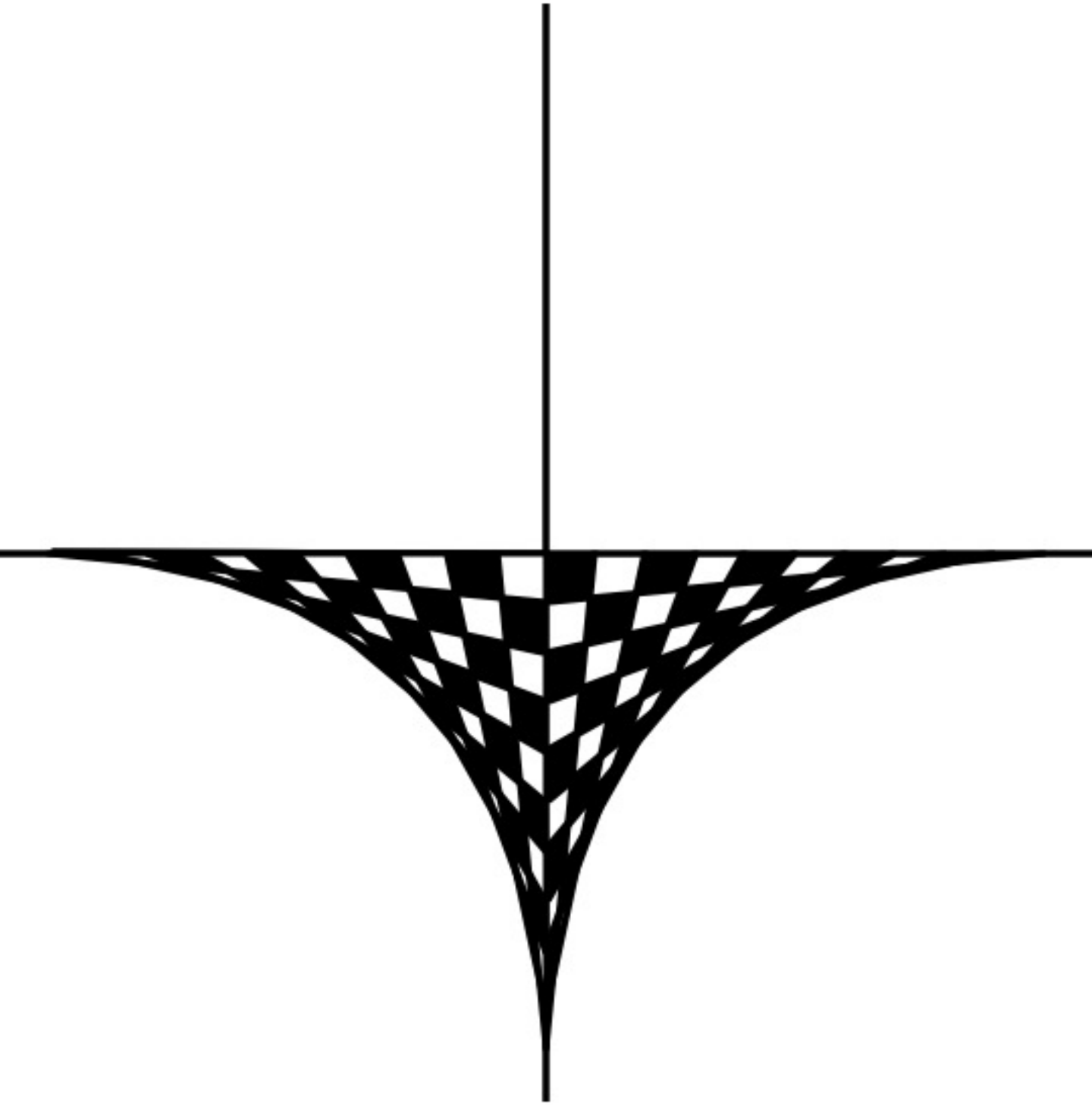

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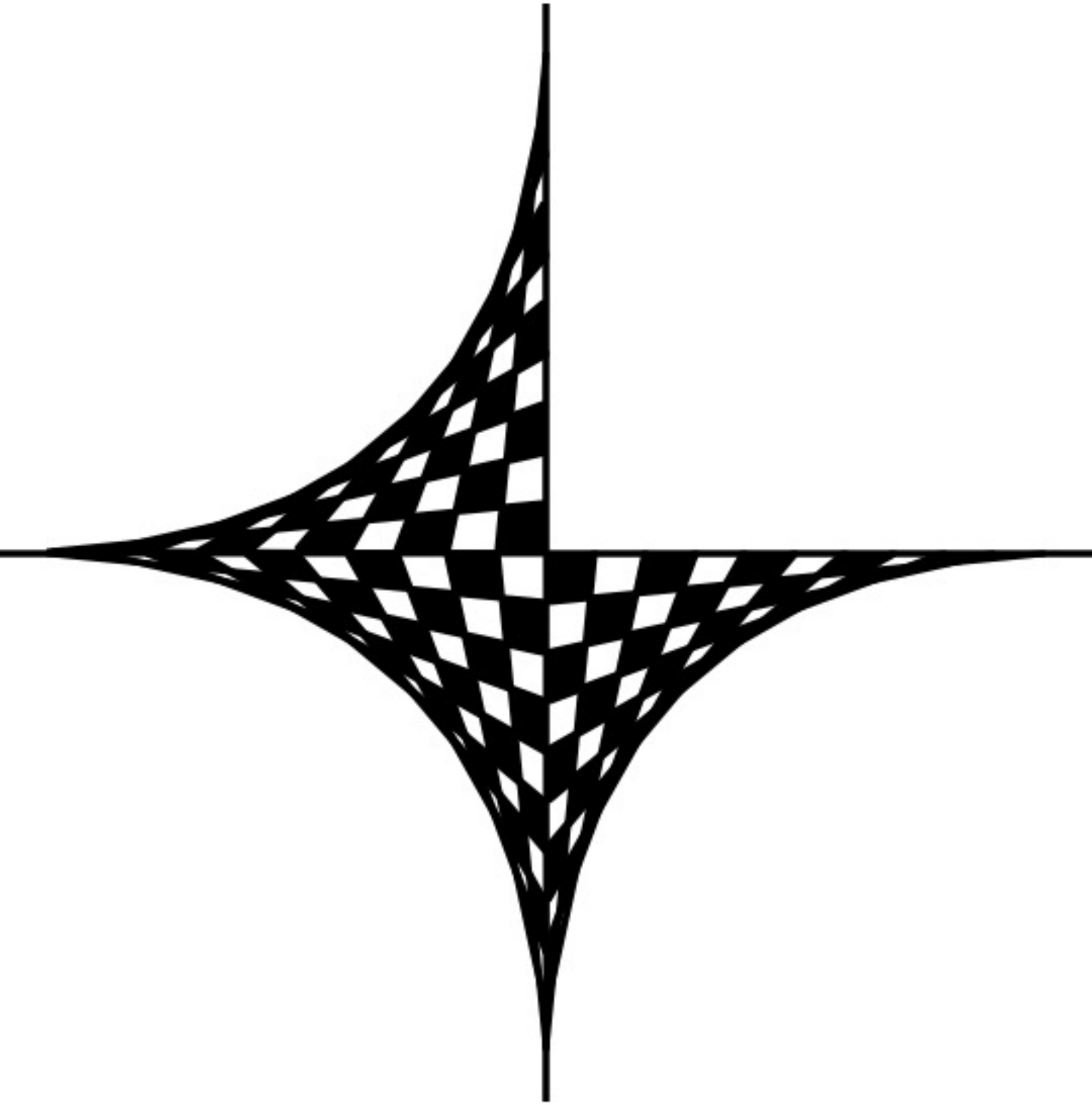

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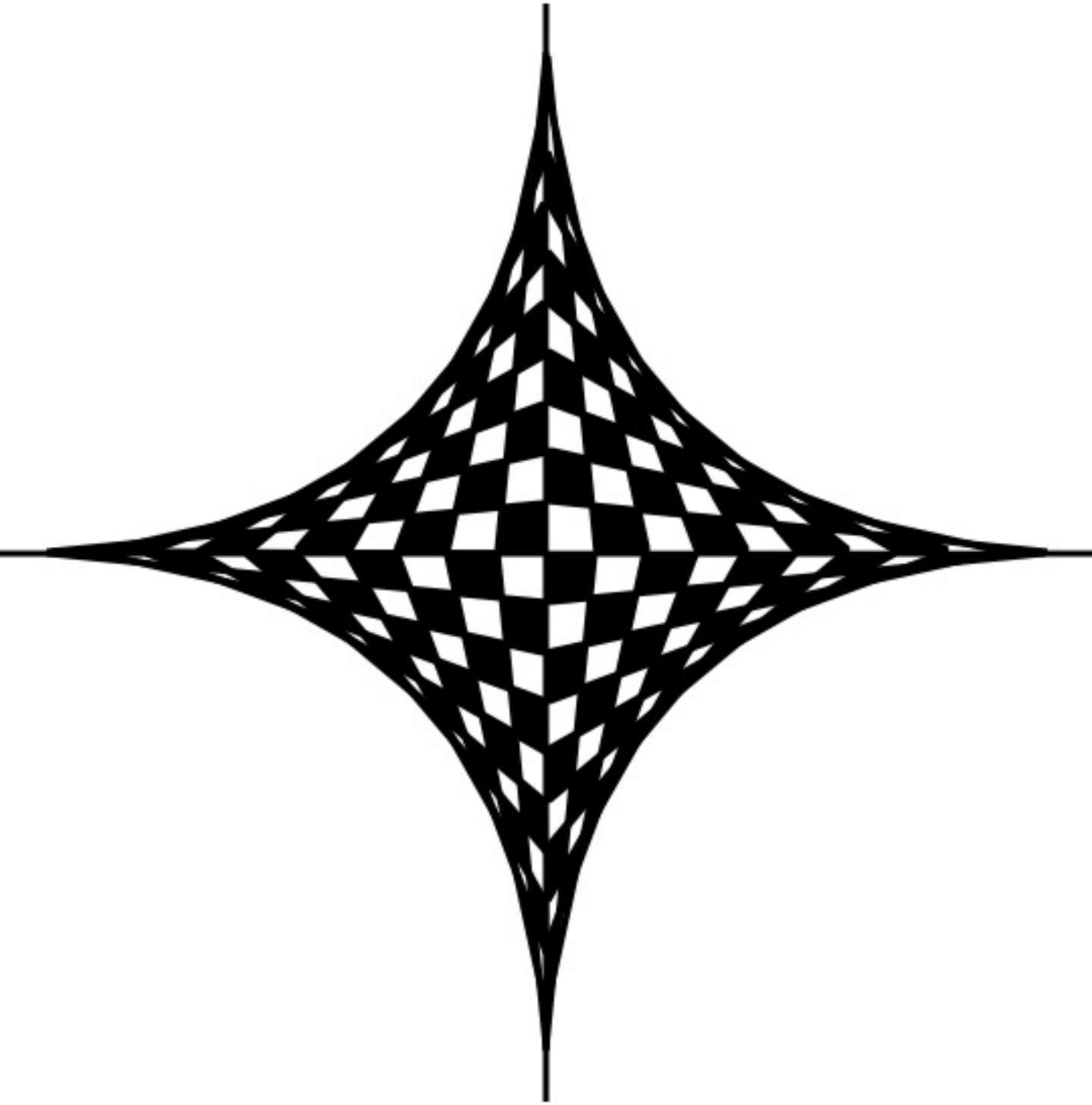

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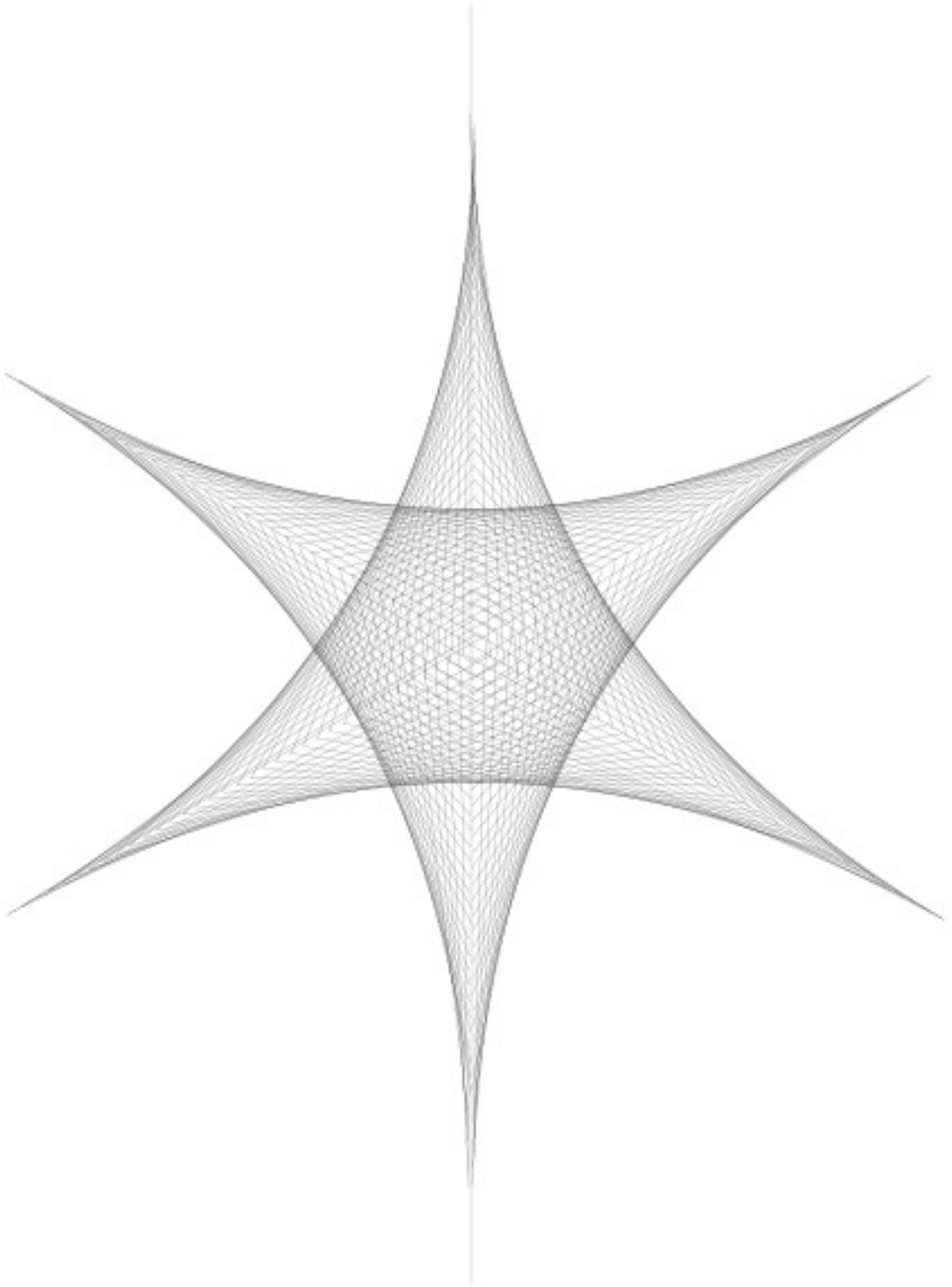

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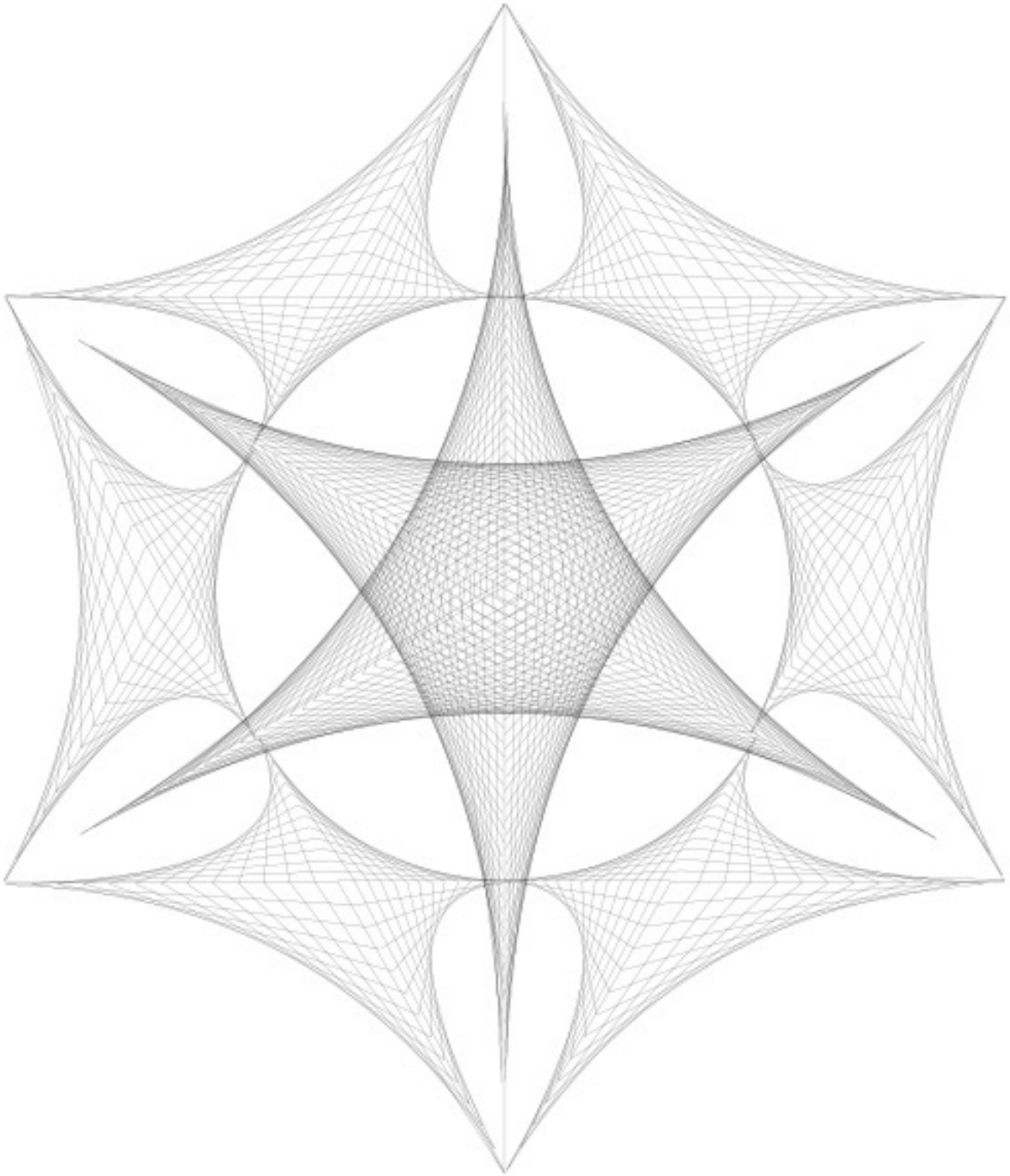

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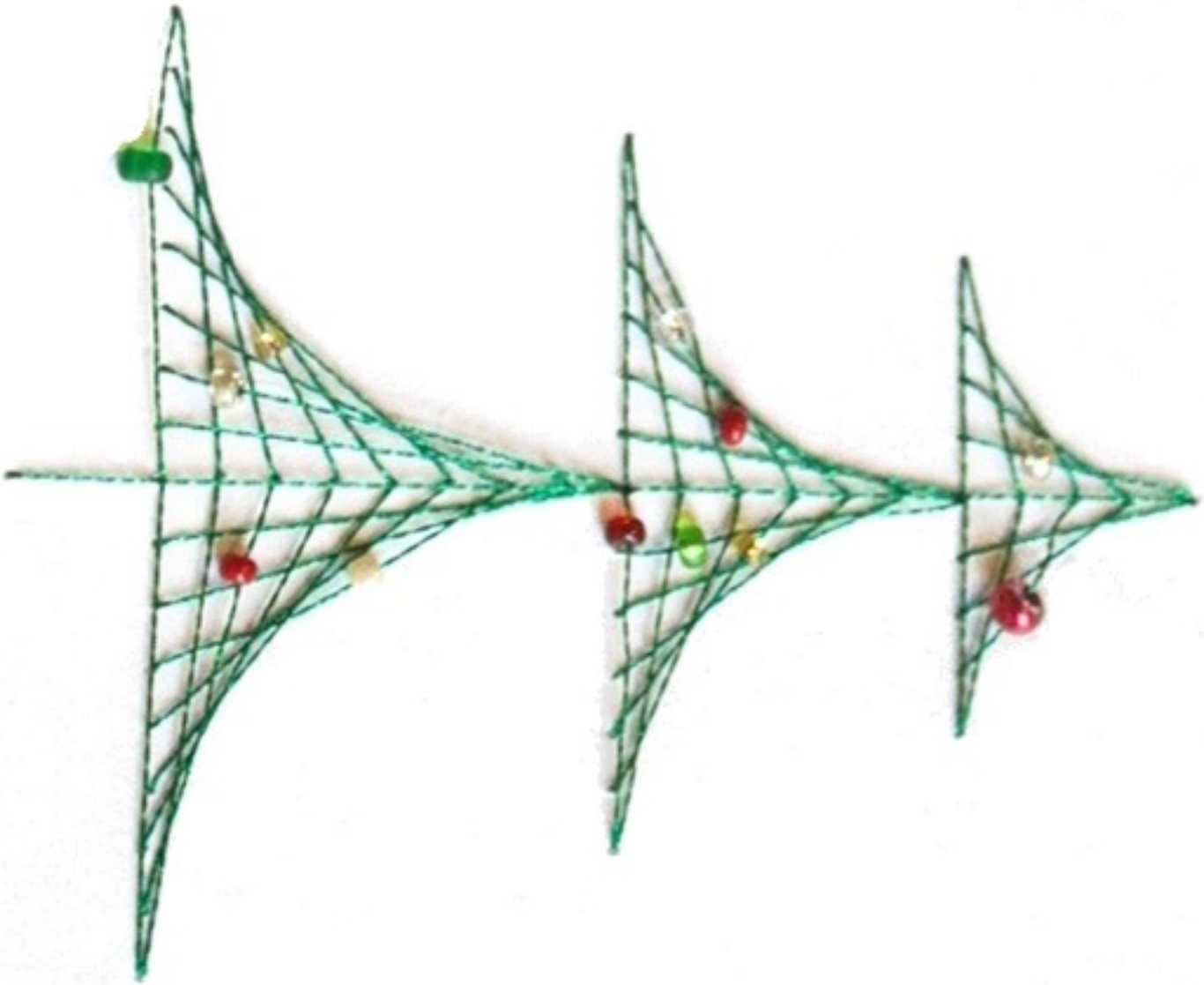

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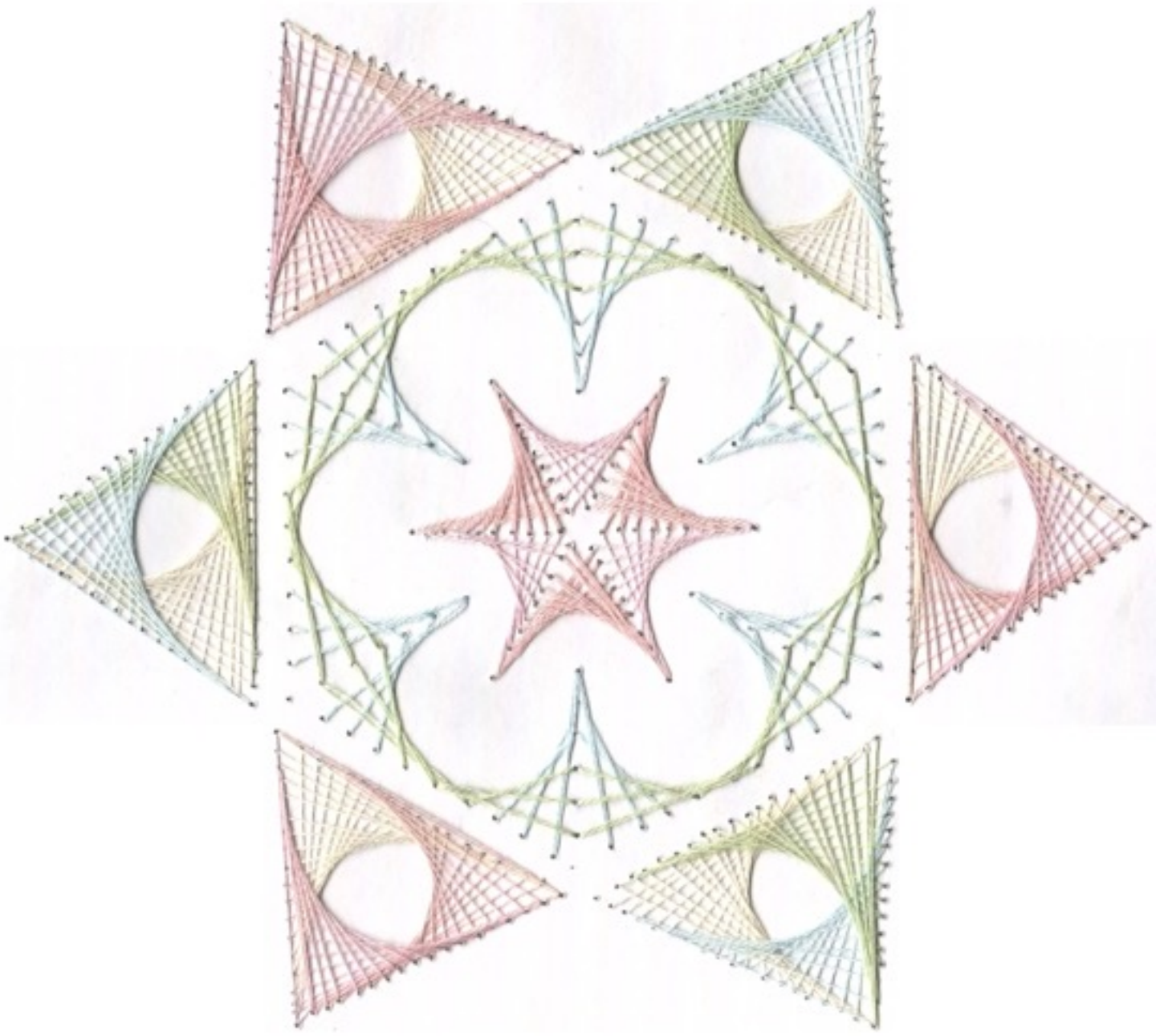

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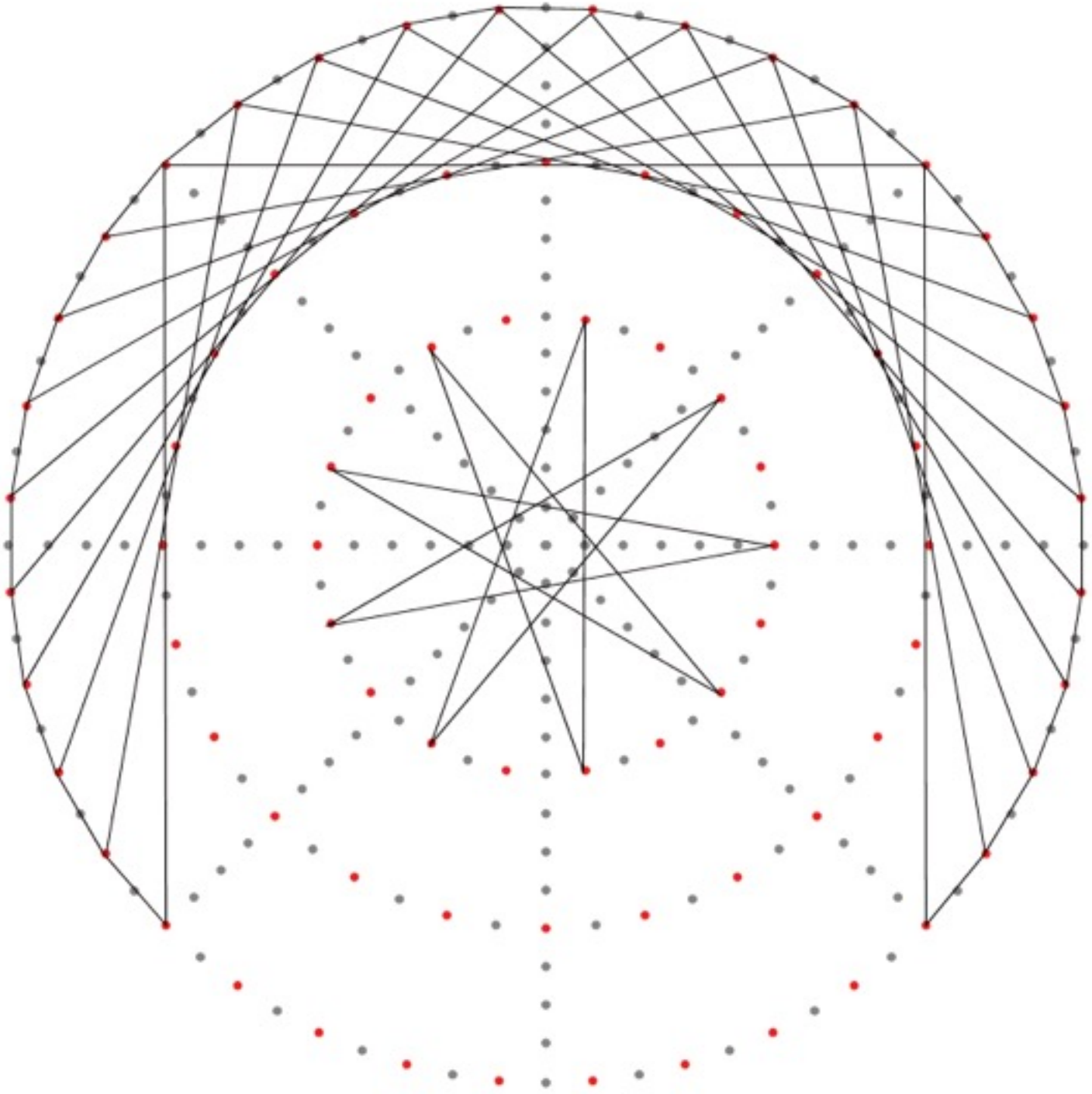

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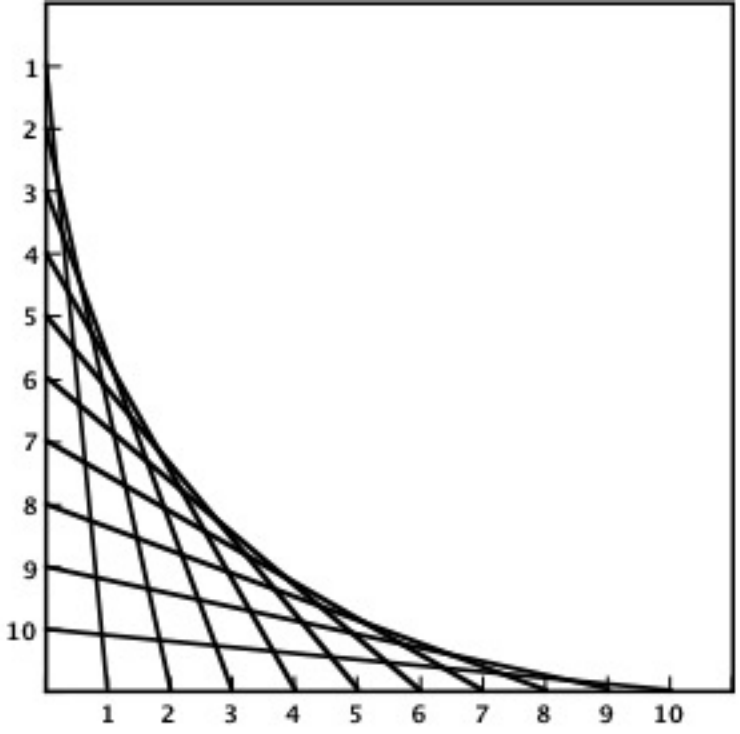
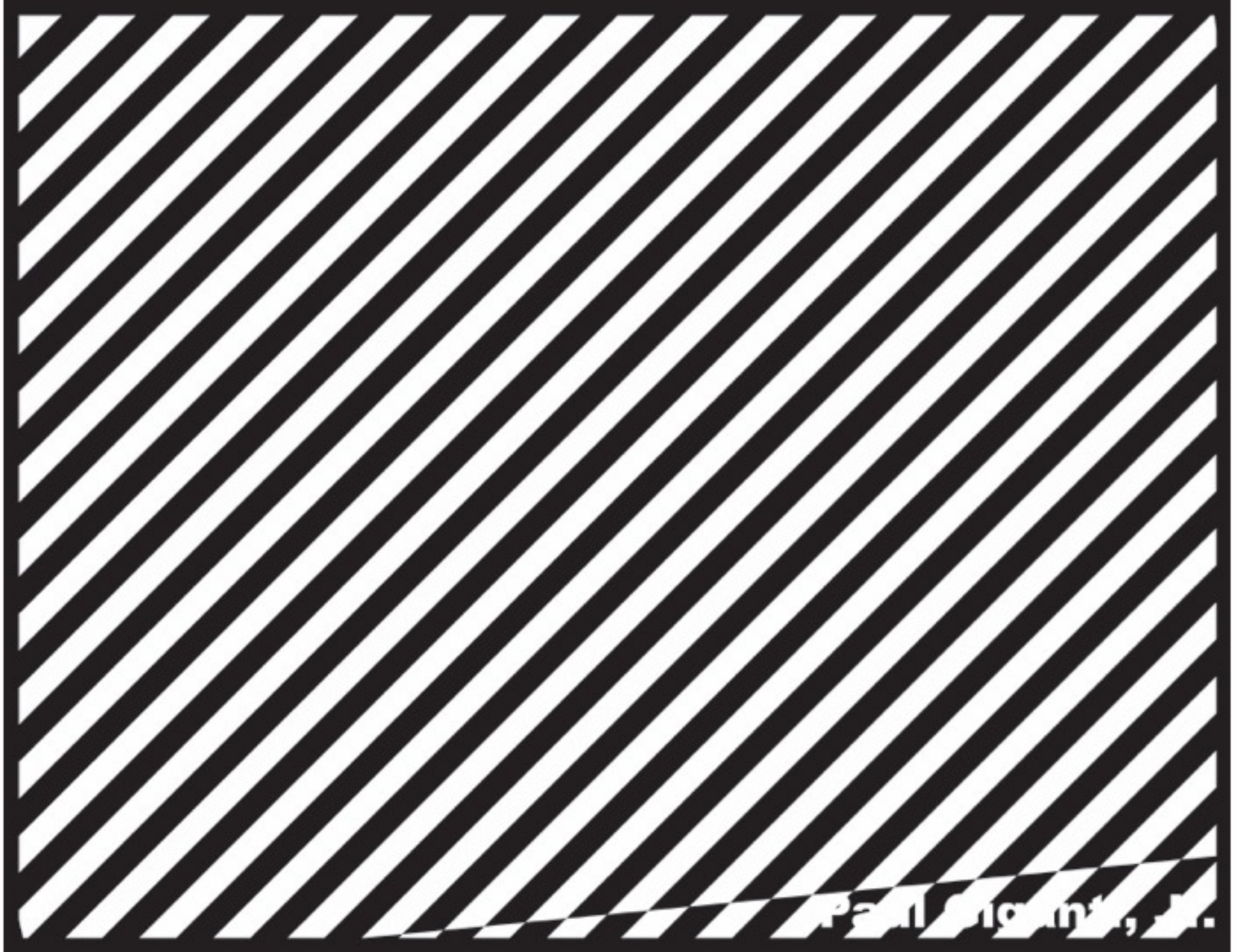


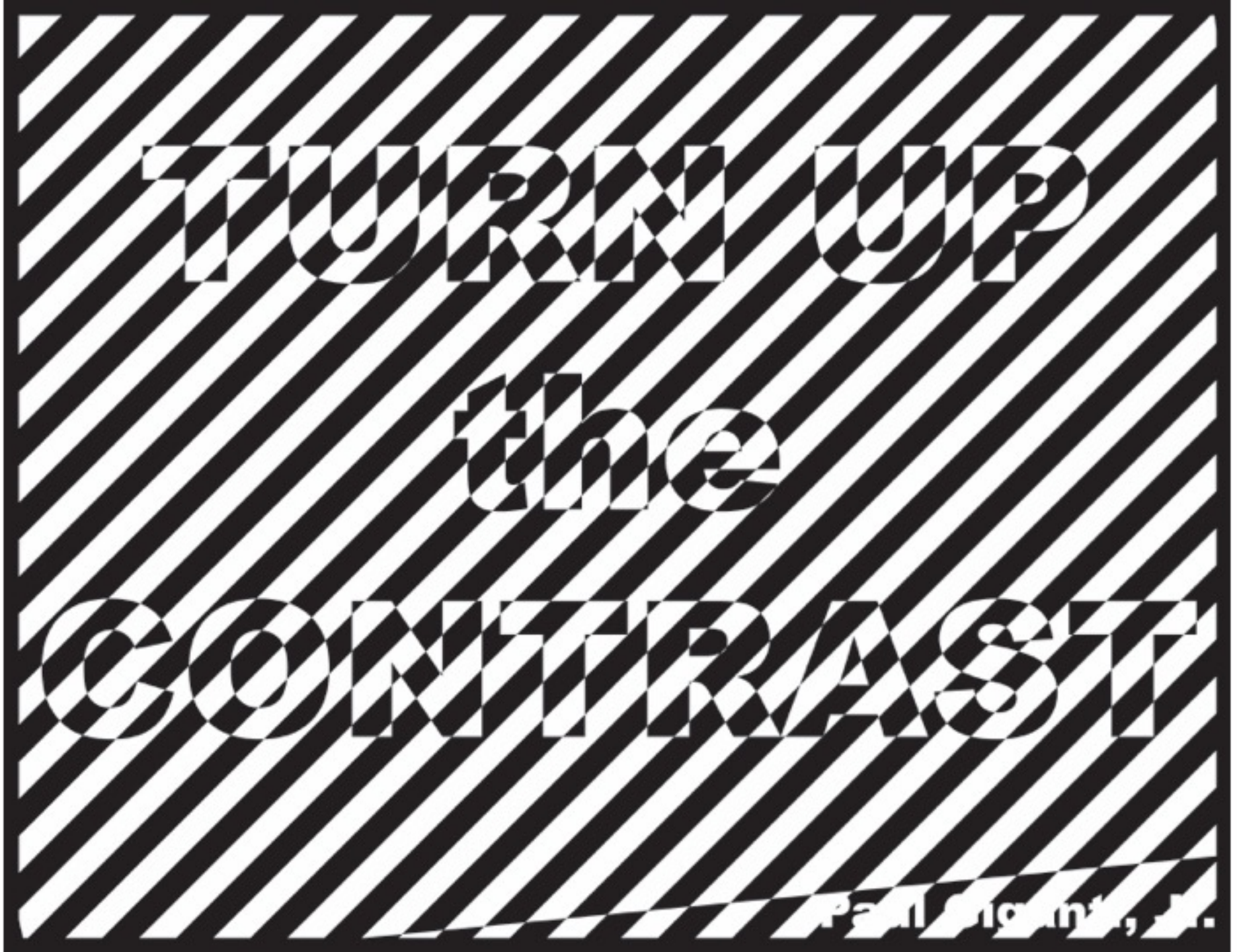
Directions…

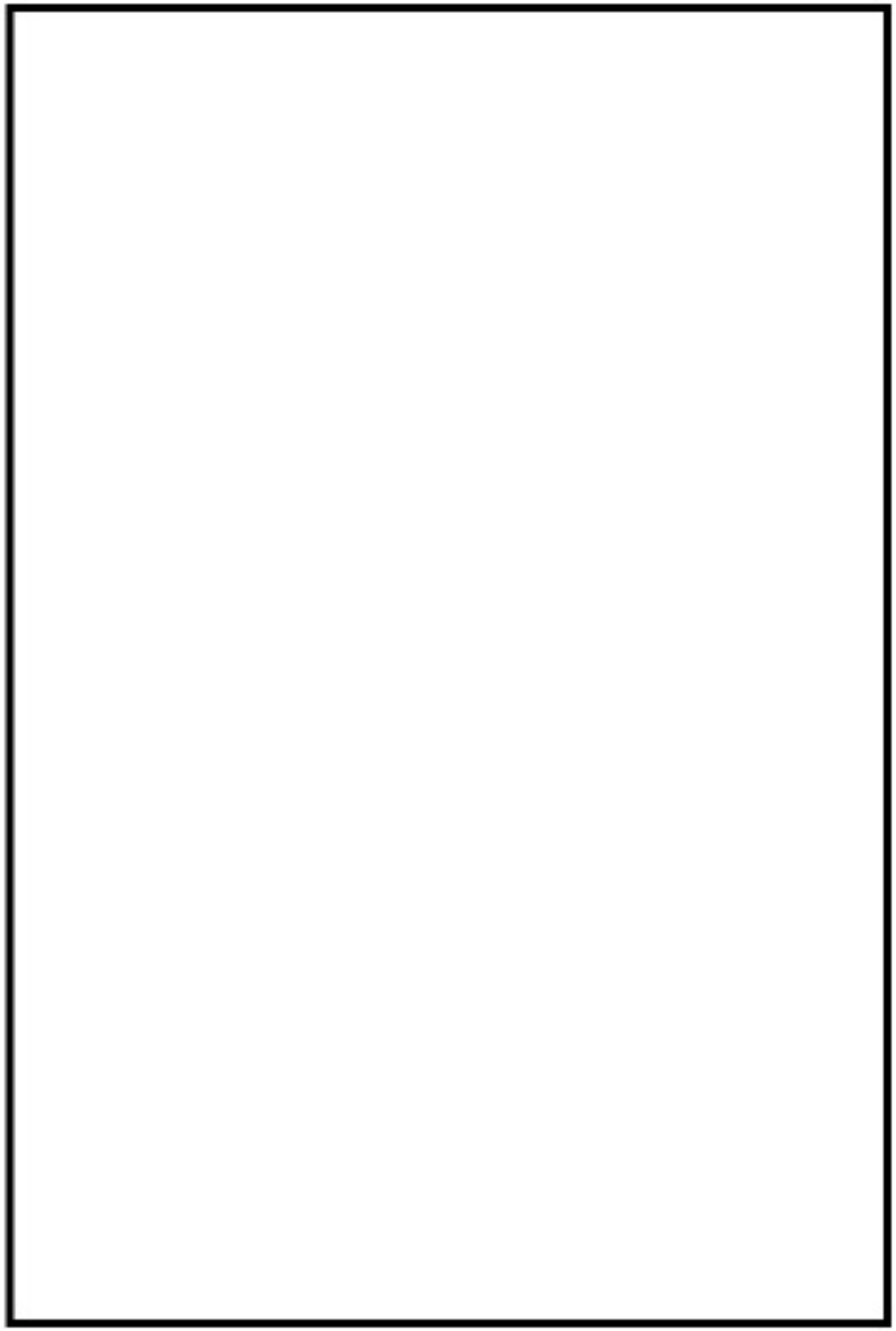
- Start with a square
- From a corner, measure in equal units until you reach the end of the side
- From the same corner, measure in the same units in the other direction
- Number from 1 to 10+ horizontally, from 10+ to 1 vertically
- Connect like numbers with straight lines

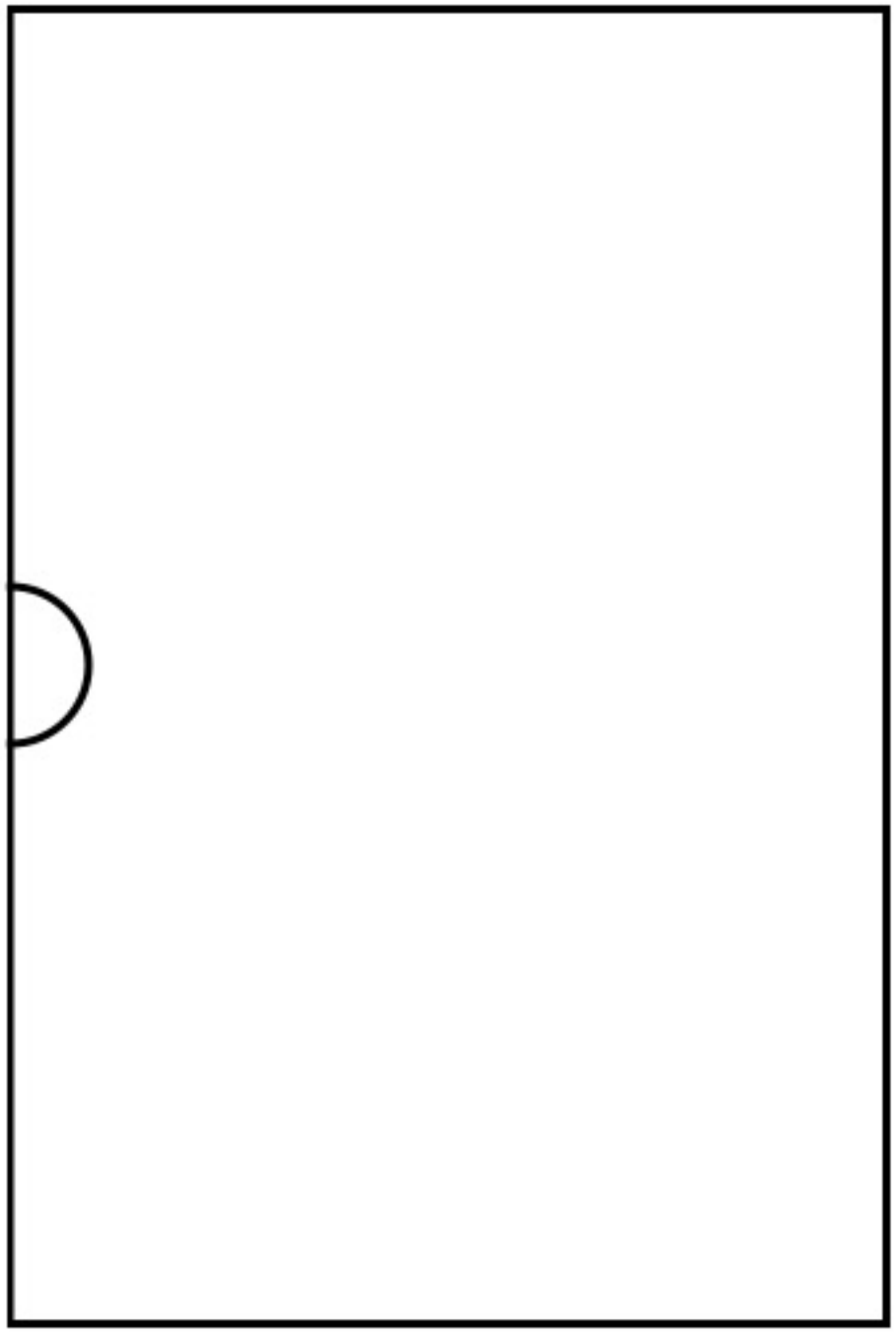
*Remember, number lightly, then erase the numbers when finished

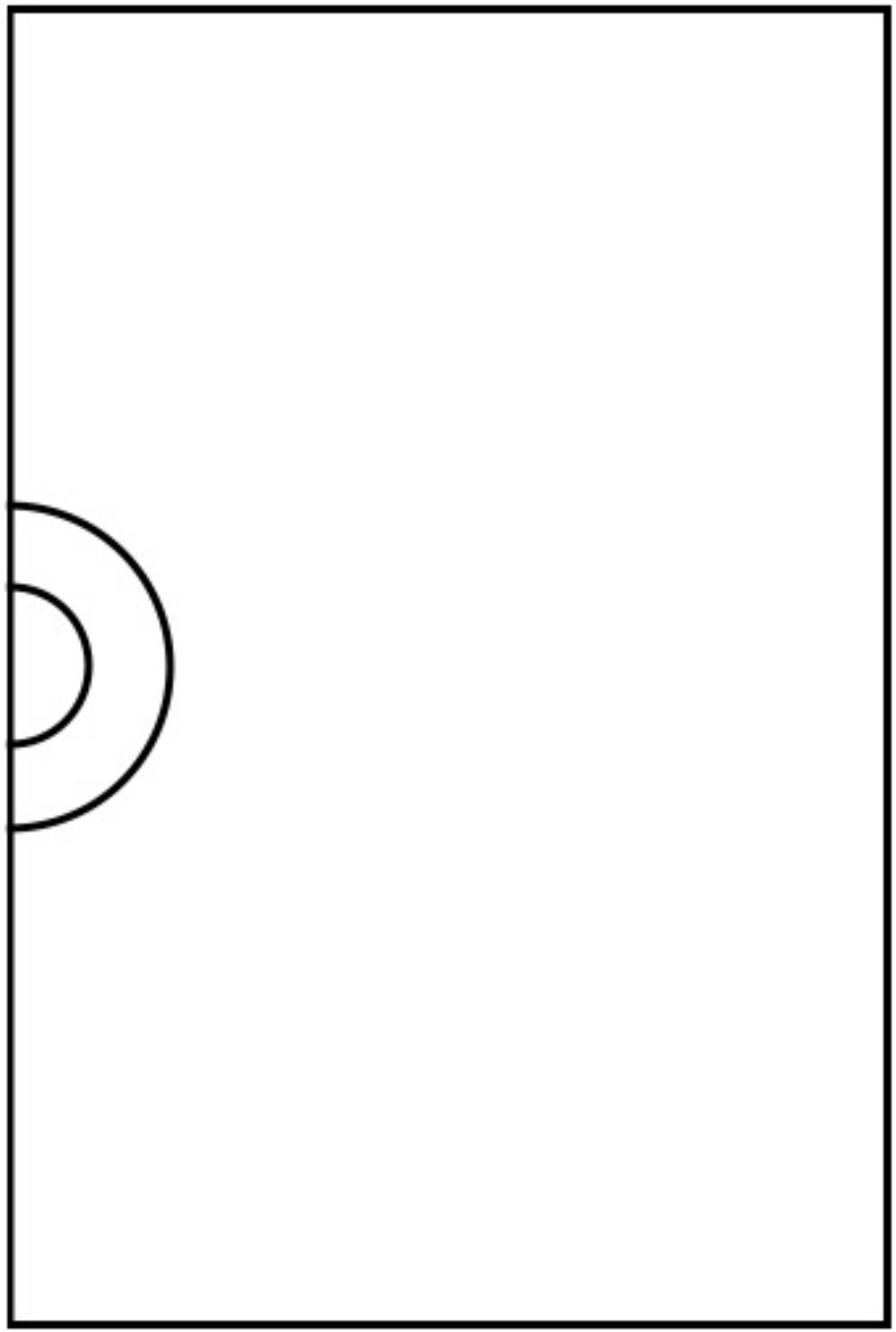
Paul Giganti, Jr.

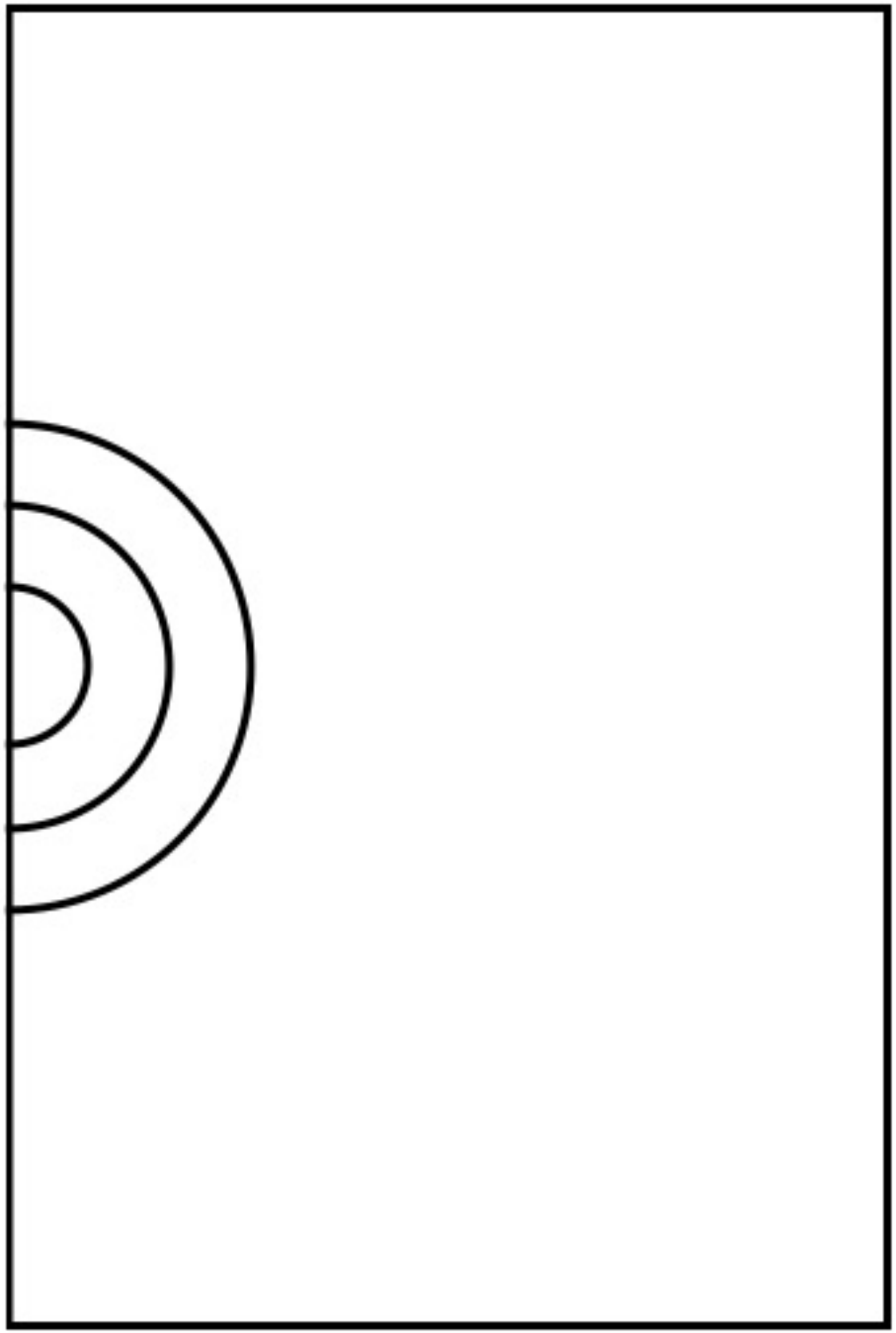


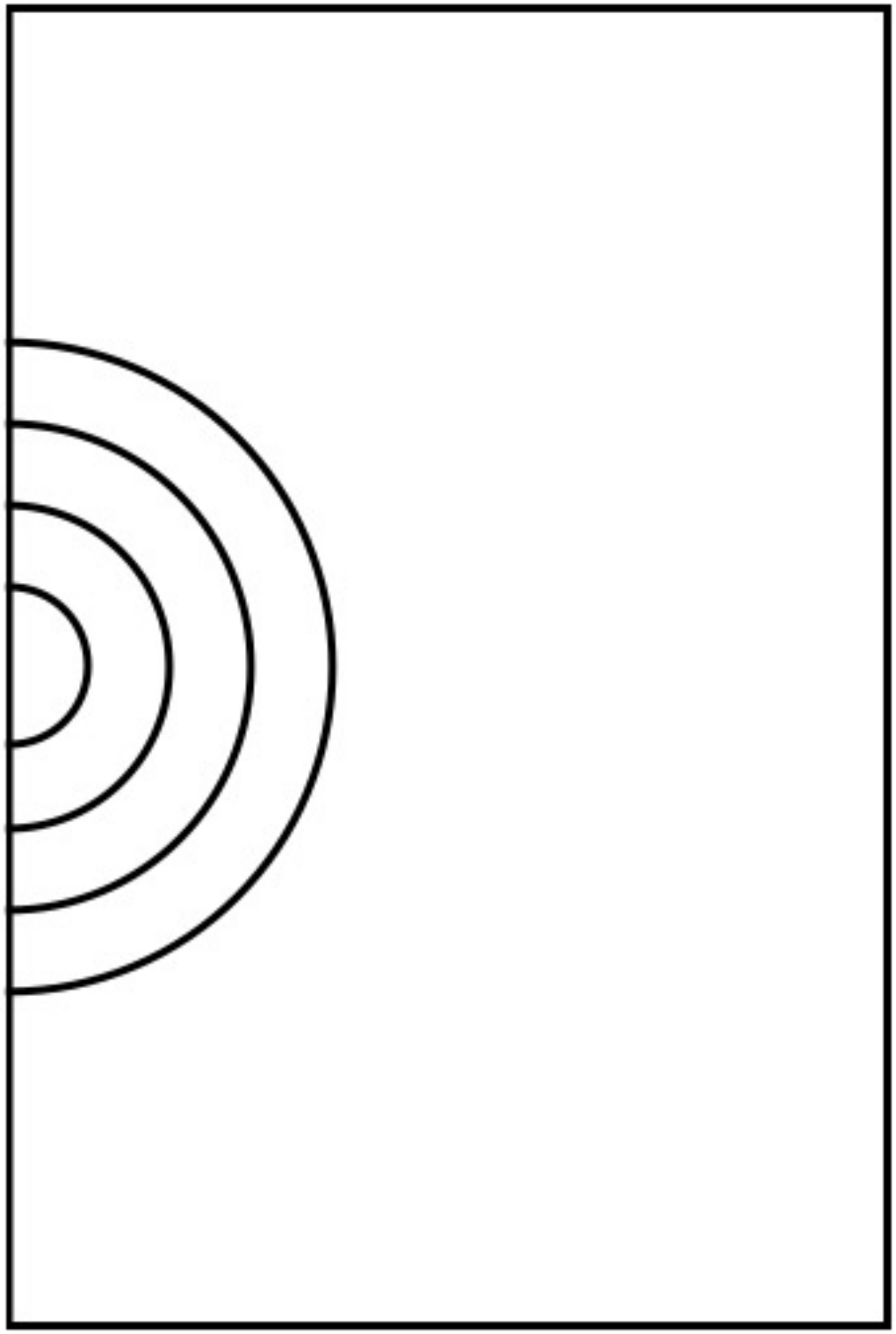

TURN UP
the
CONTRAST

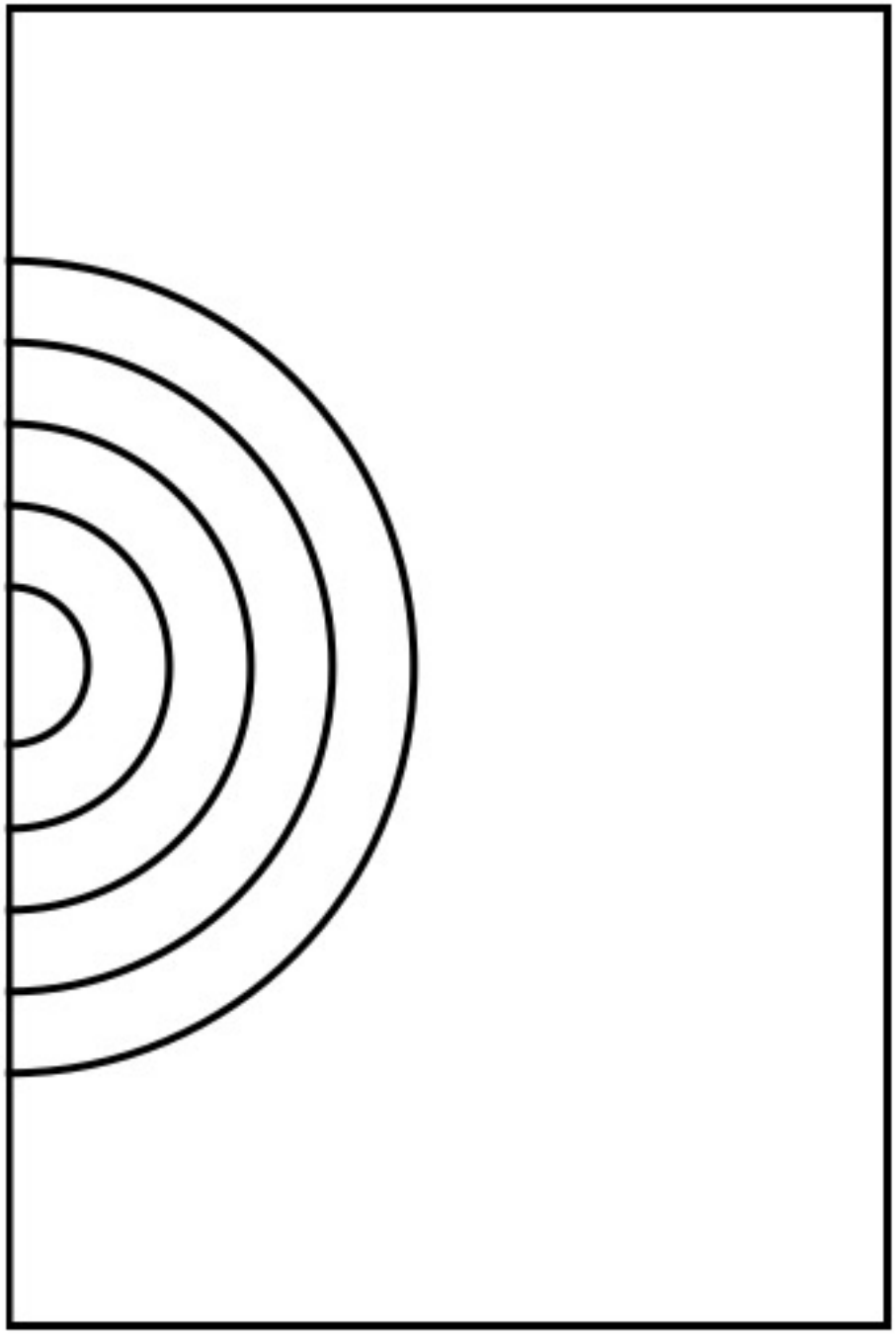


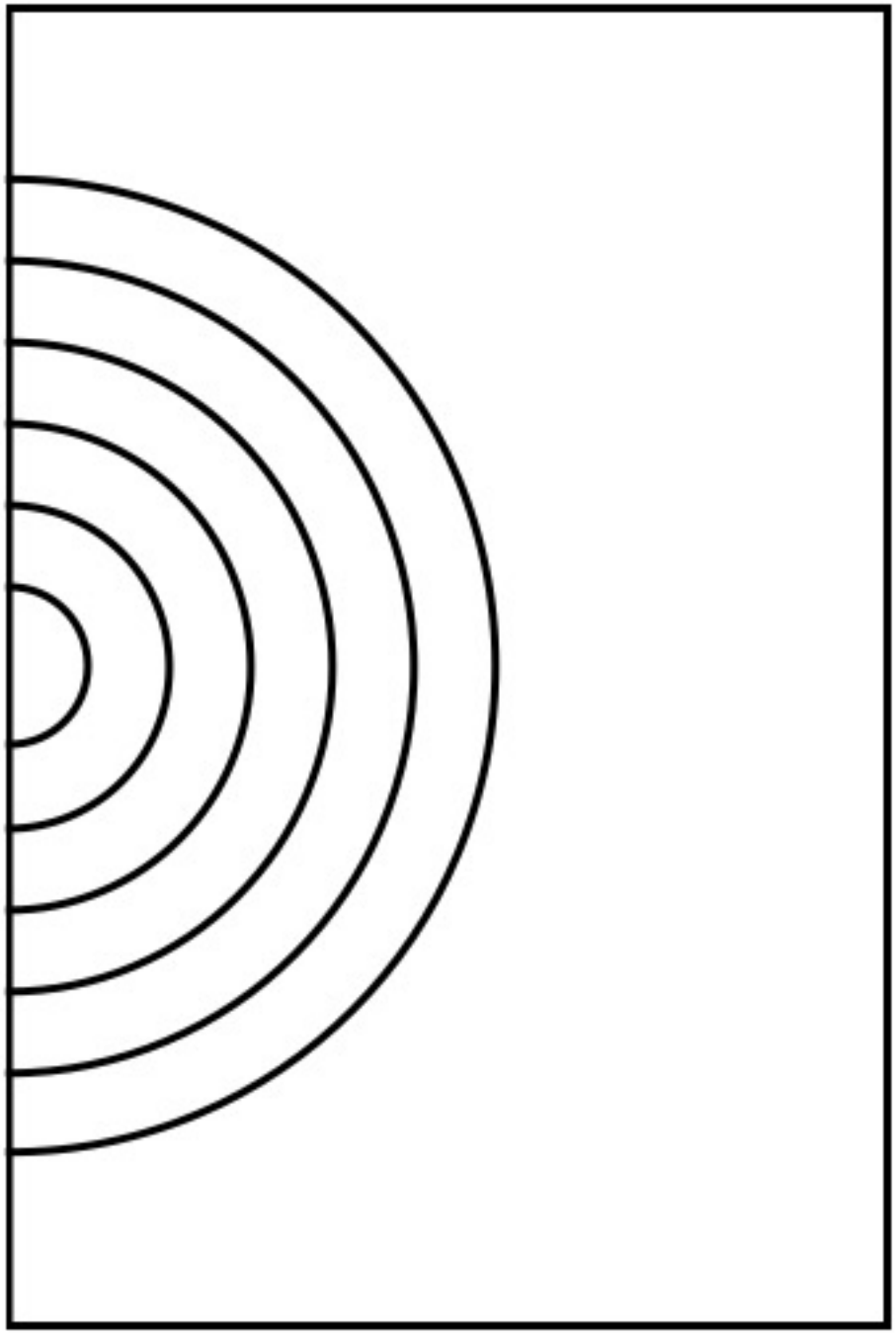


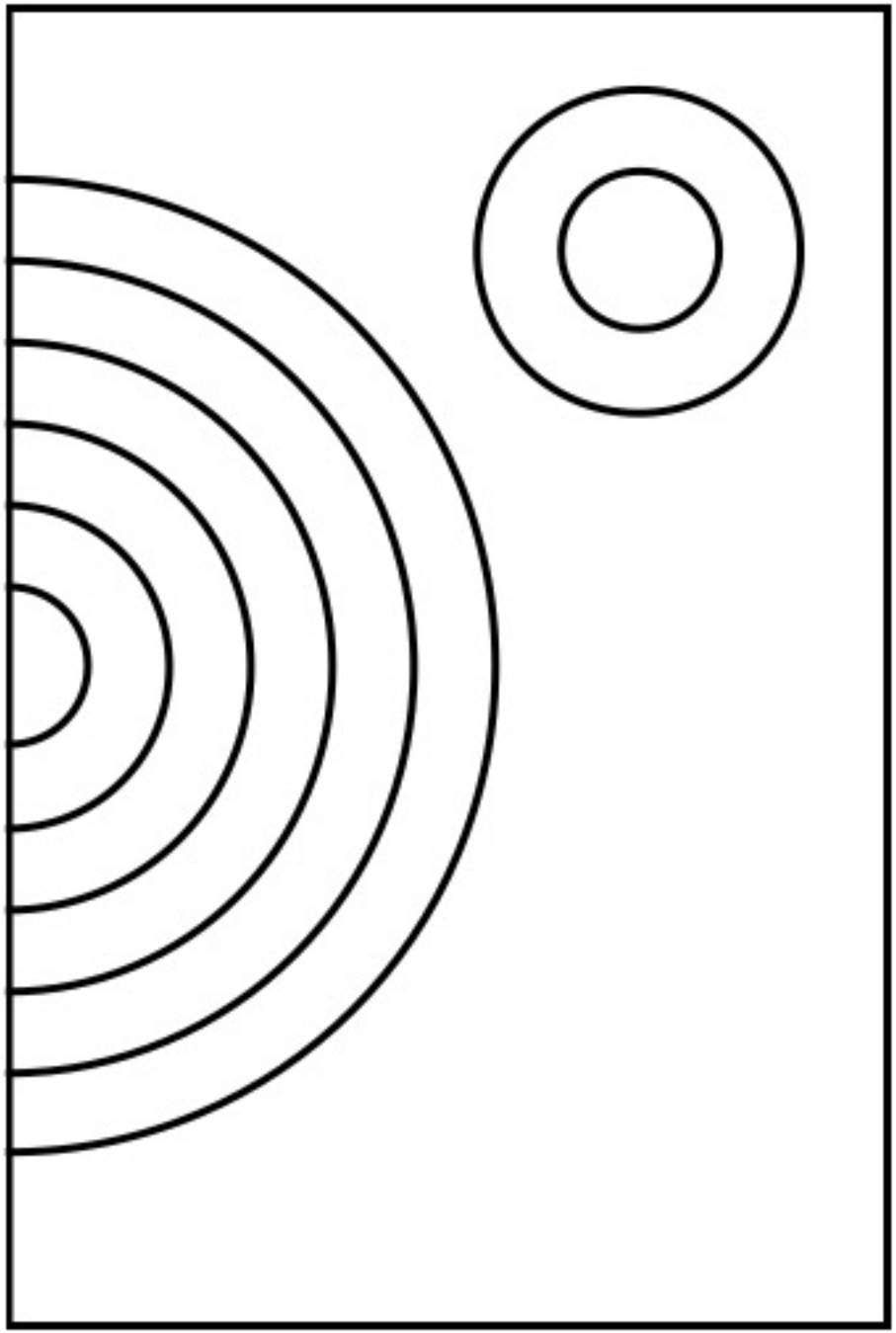


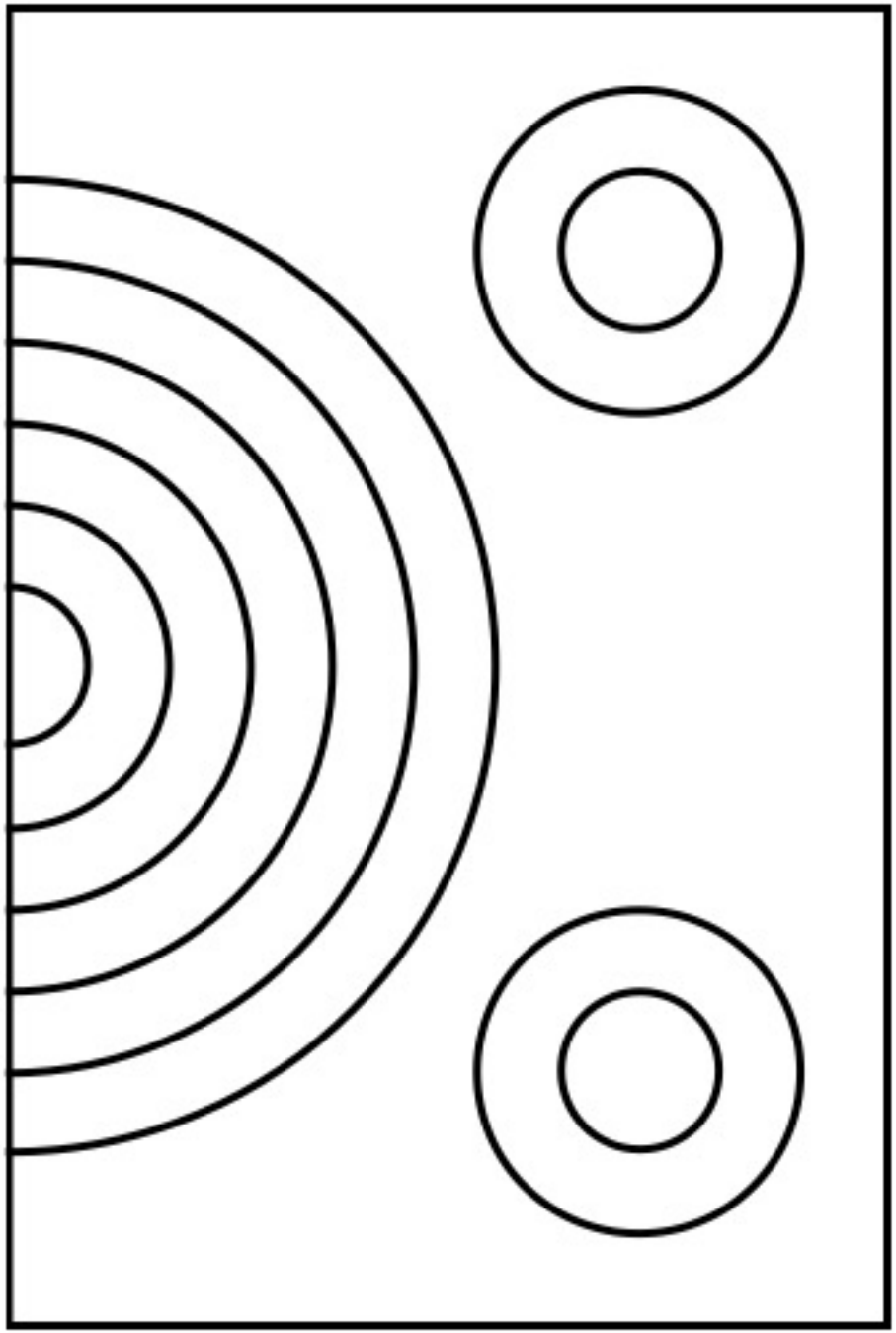


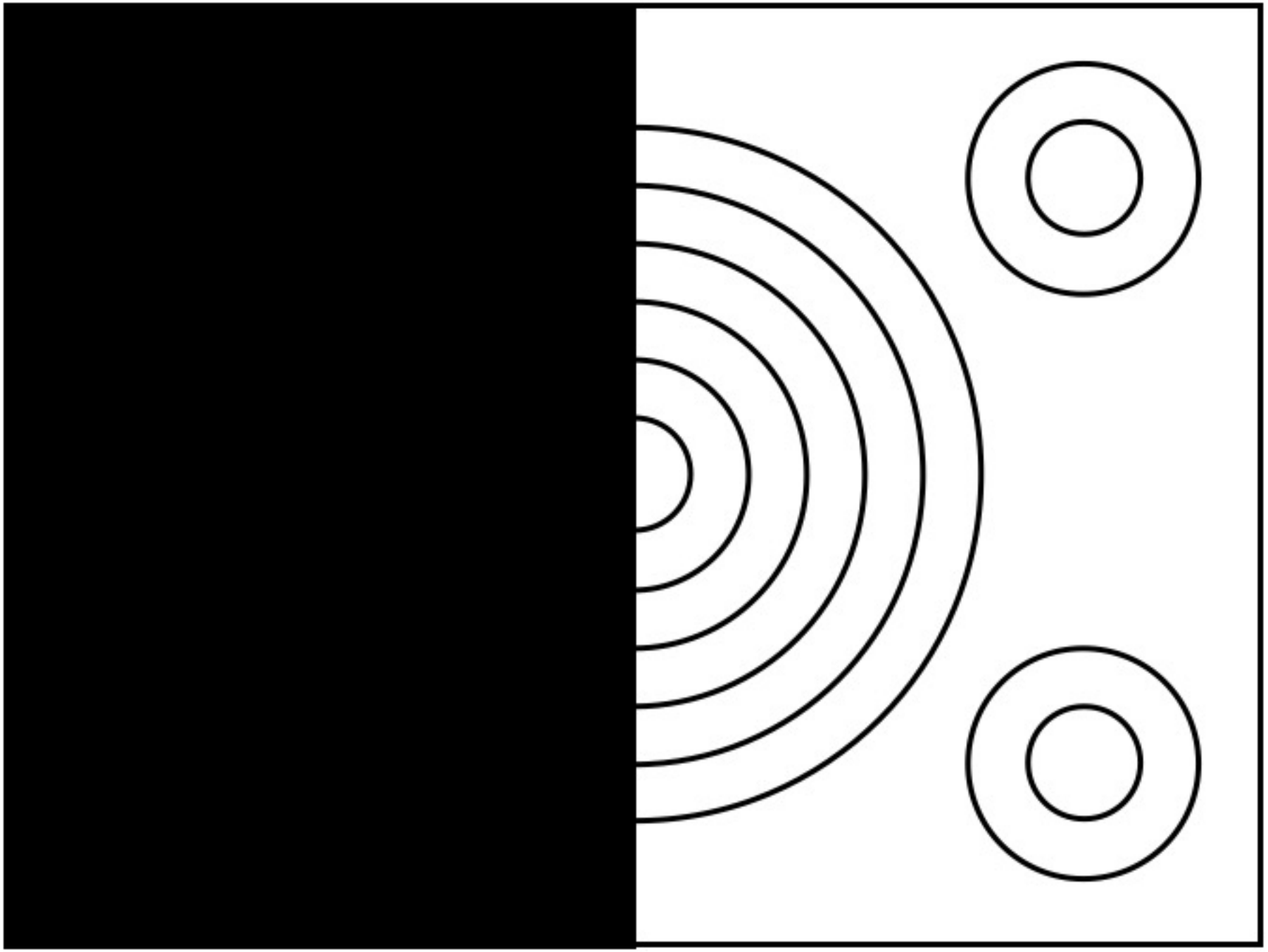


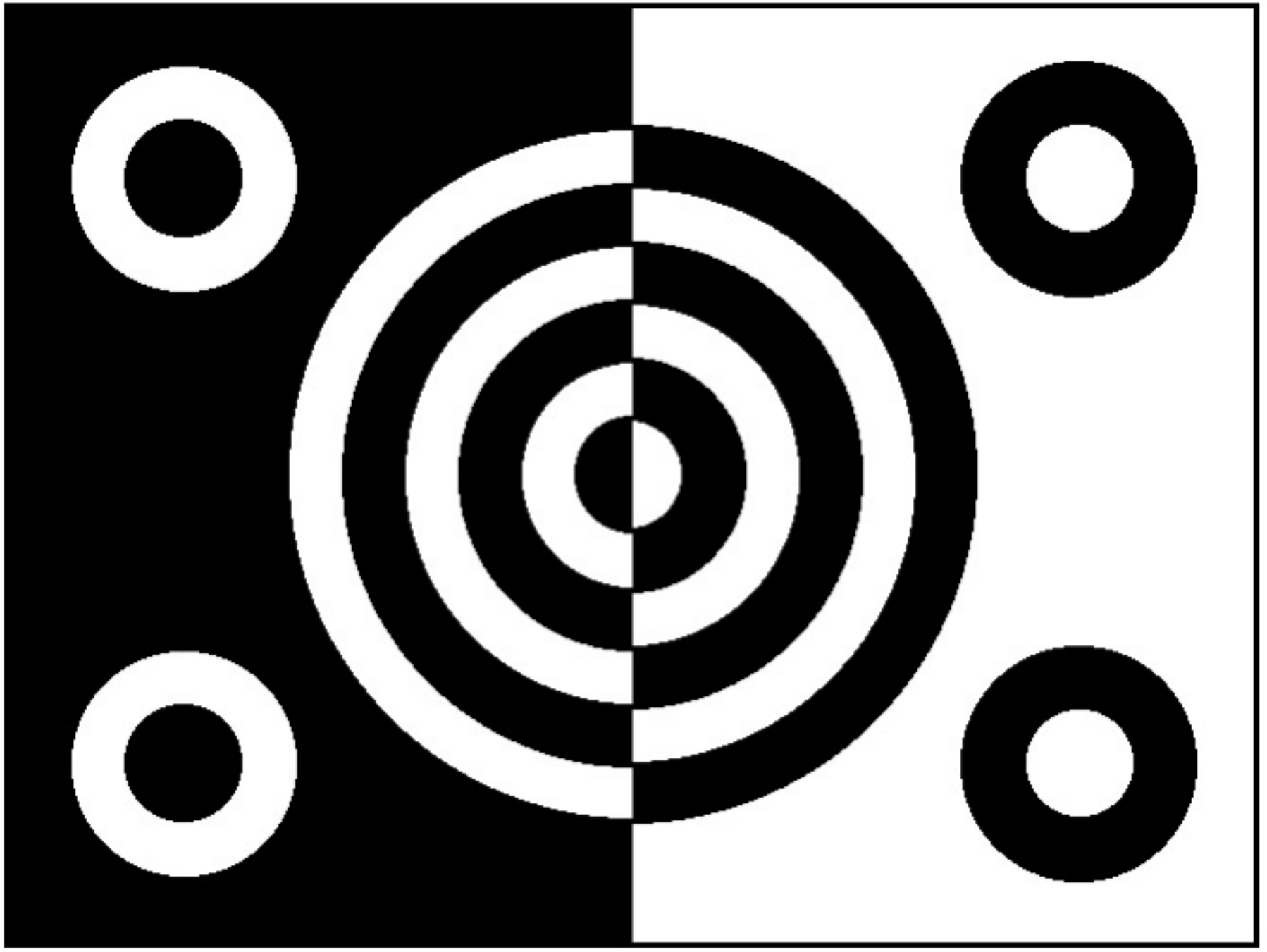


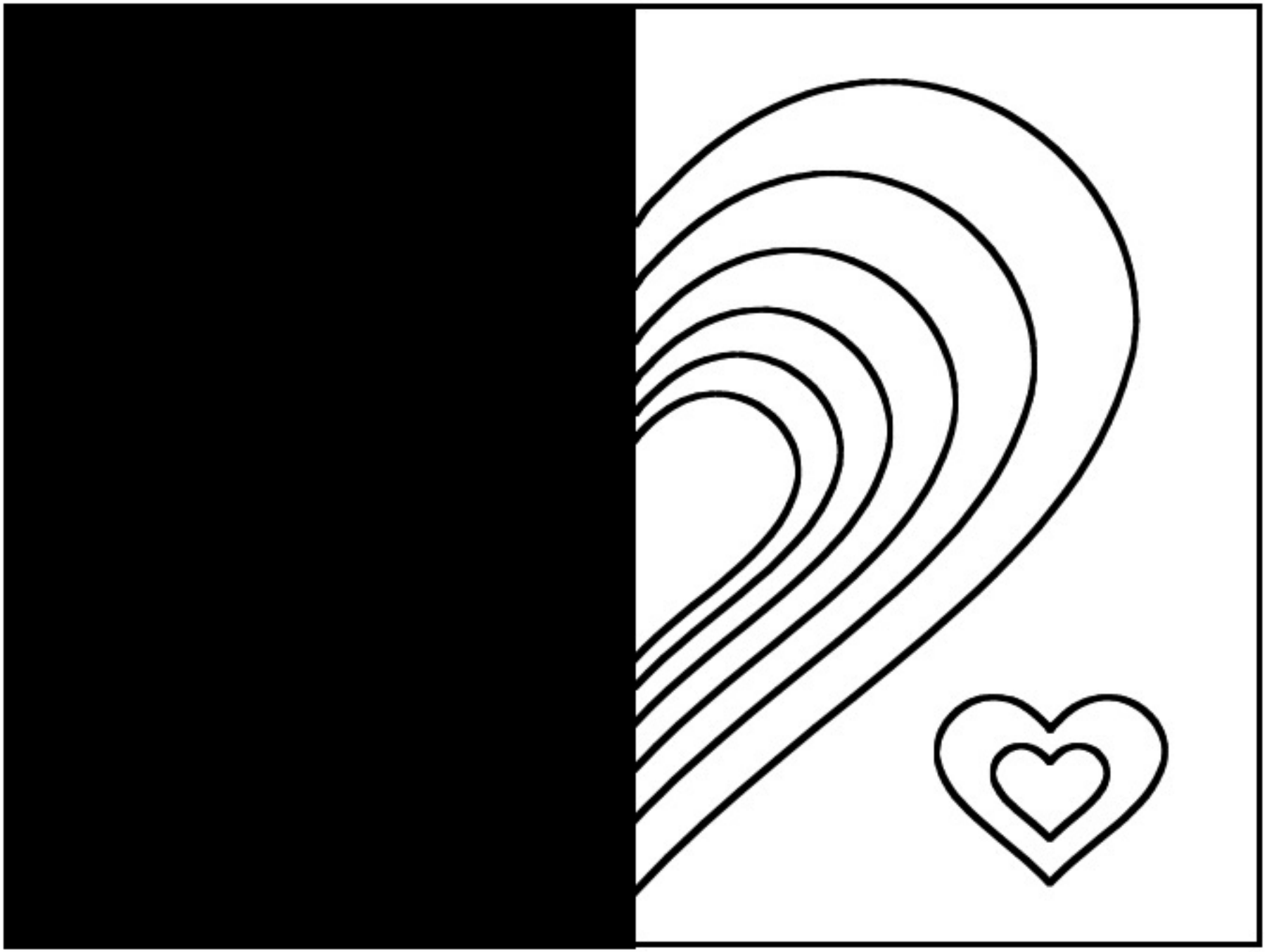


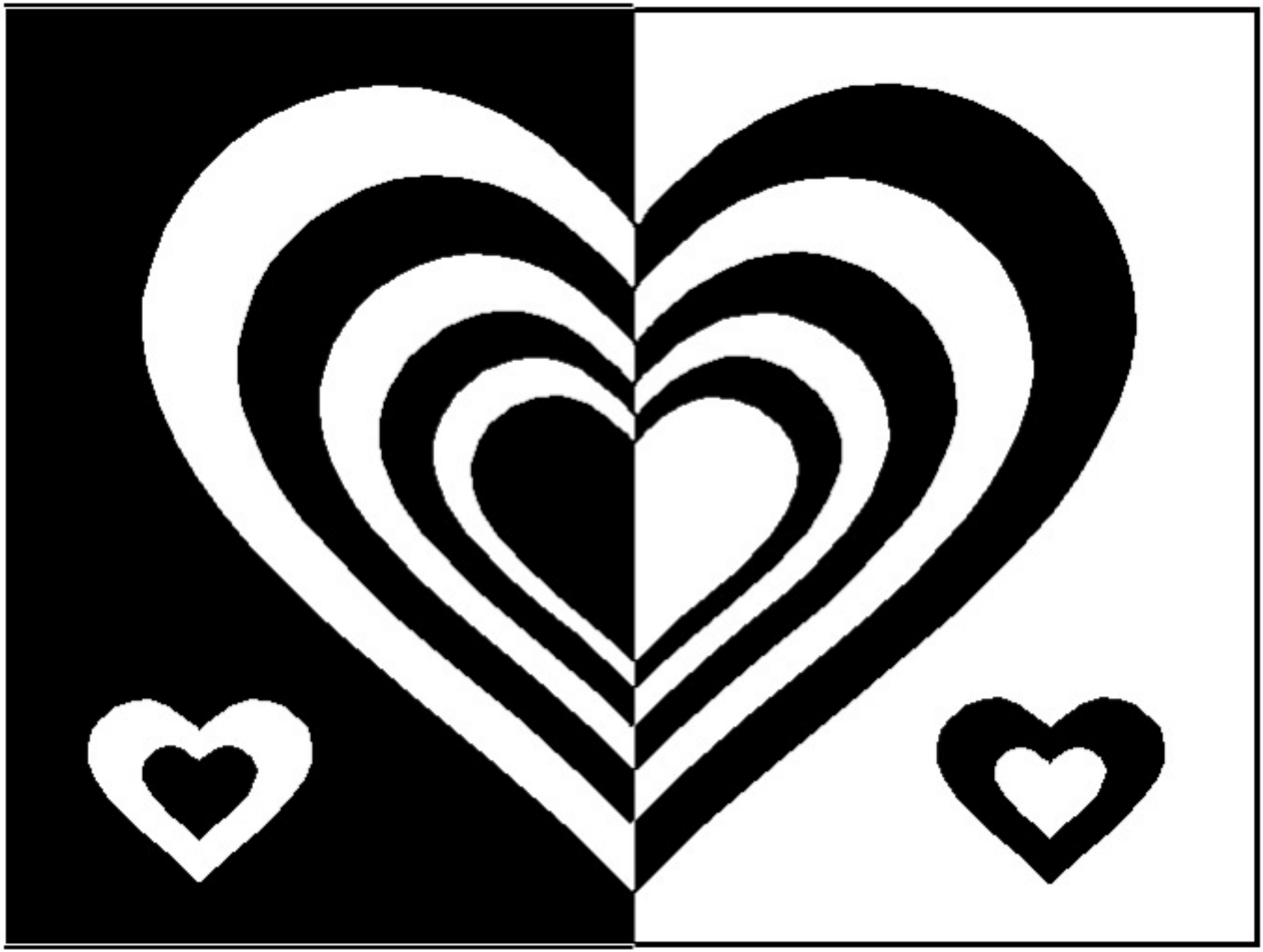


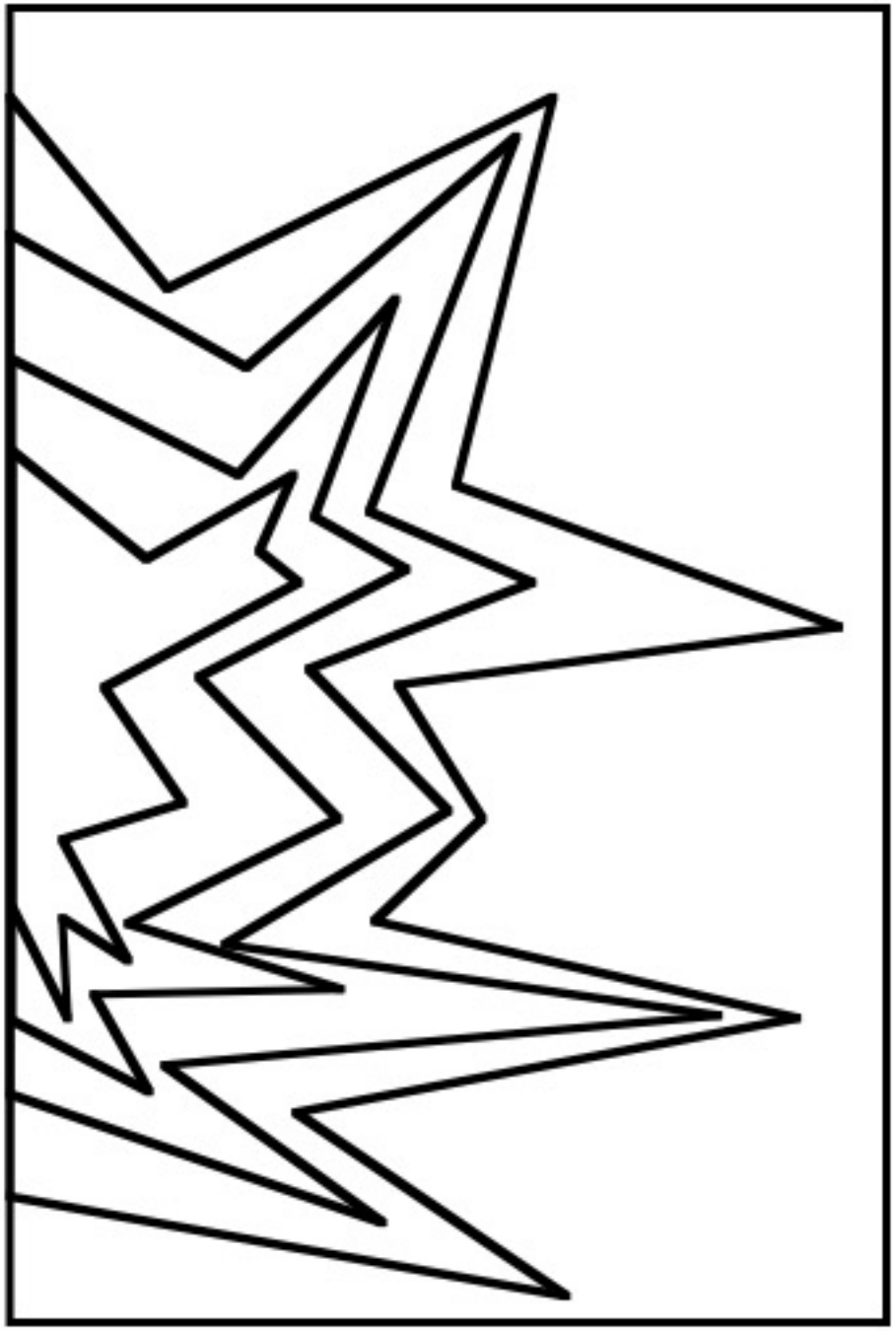


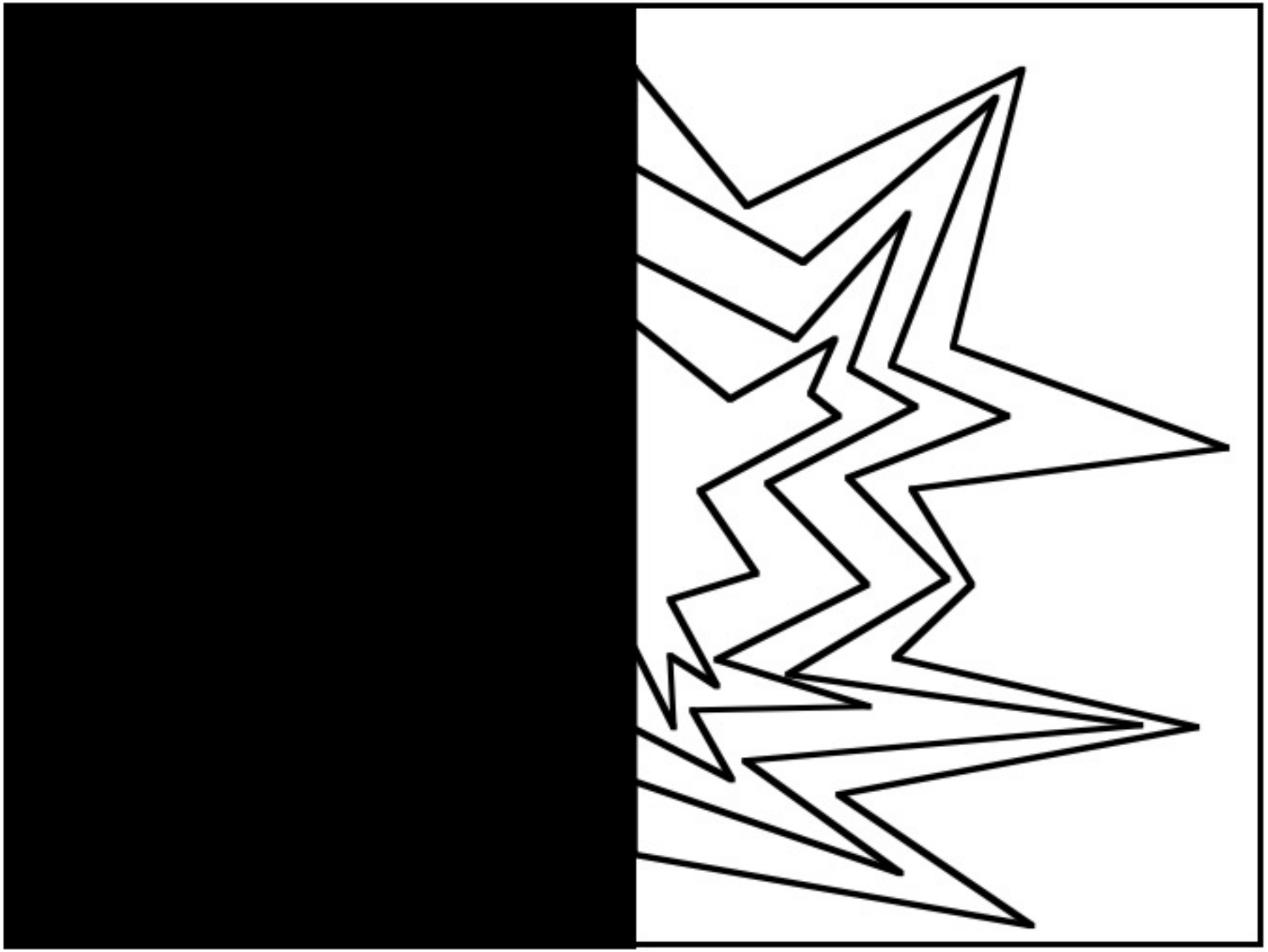


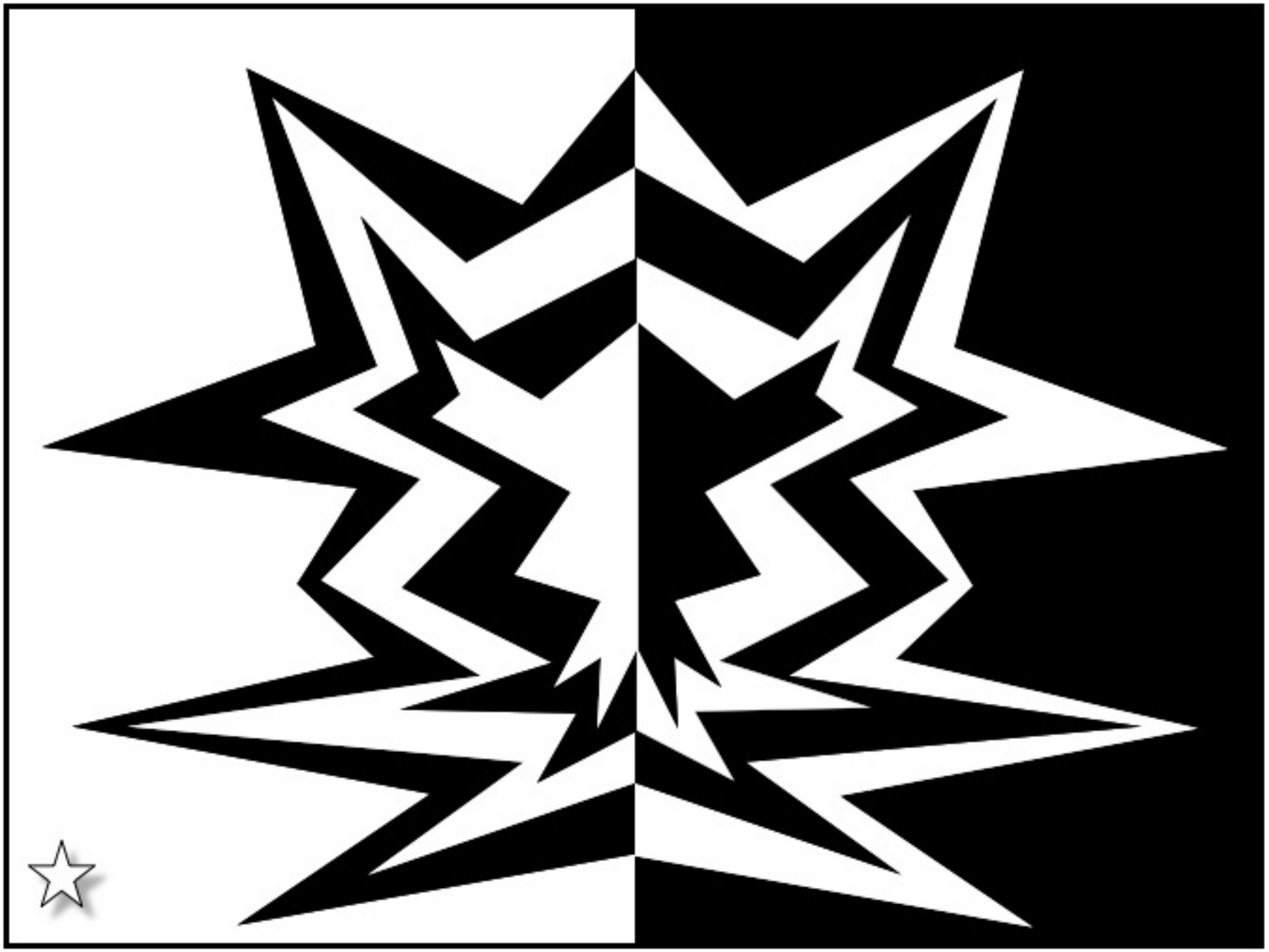










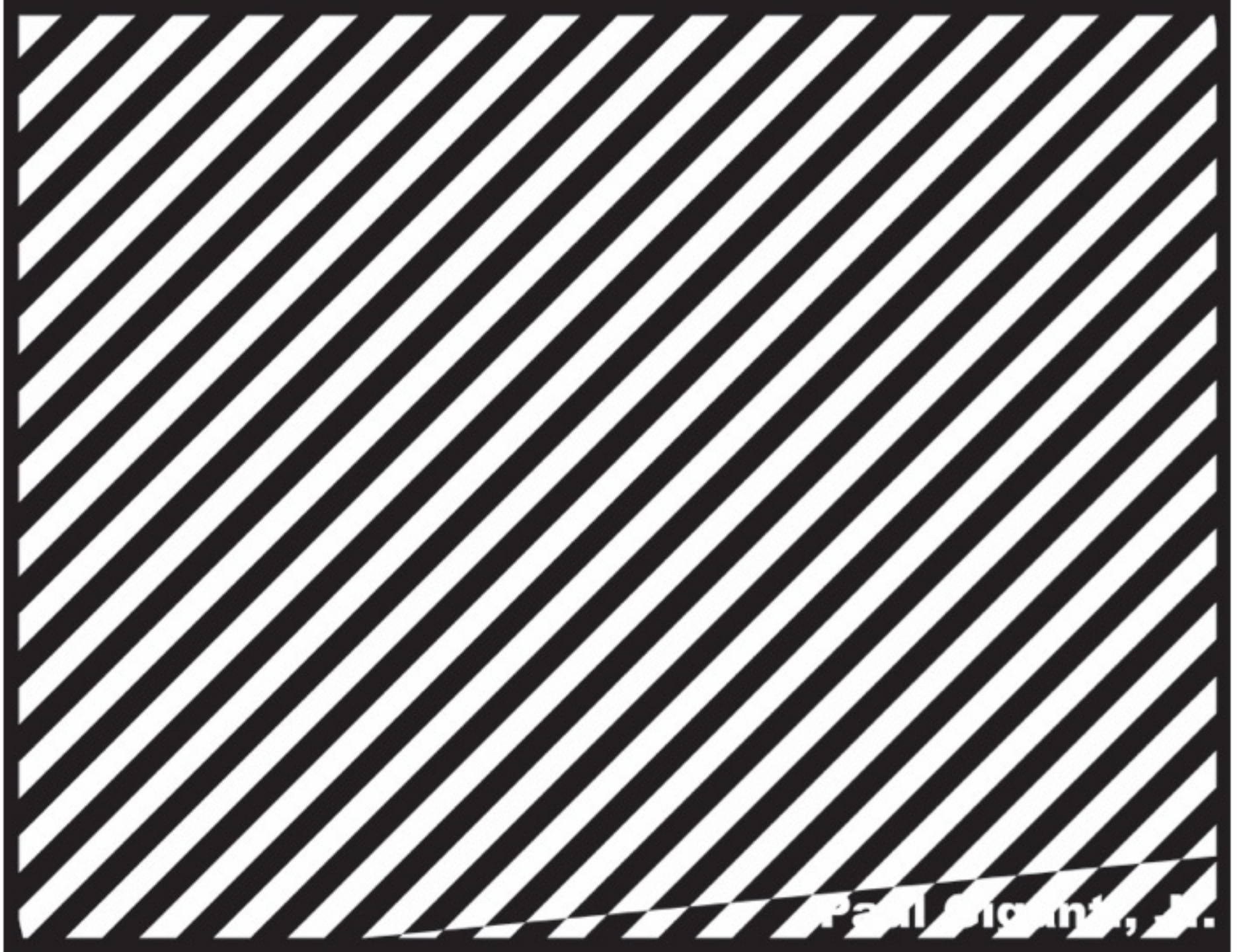


Directions…

- Start with a half sheet of black paper and half of white paper
- Paperclip the two together on three of their edges.
- Plan your design first on scratch paper, then make one cut at a time starting from the inside and working out. Group and save all of the pieces!
- Alternating black and white, glue 1/2 the pieces to one half of a whole sheet of white paper. Glue the remaining pieces to the other side.

*Remember, duplicate pieces of the opposite colors must be lined up together along the center of the paper.

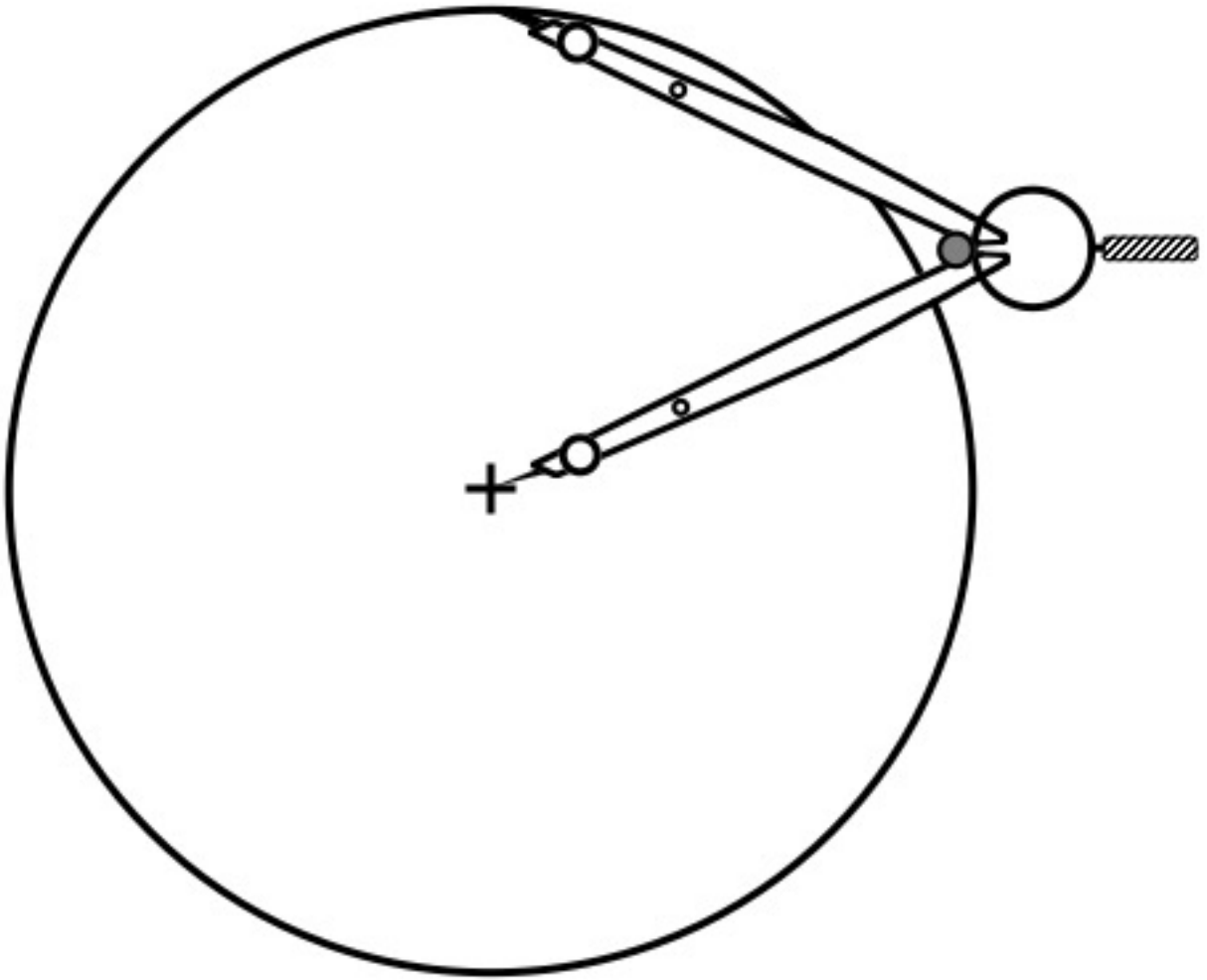
Paul Giganti, Jr.



The AMAZING HEXAGON

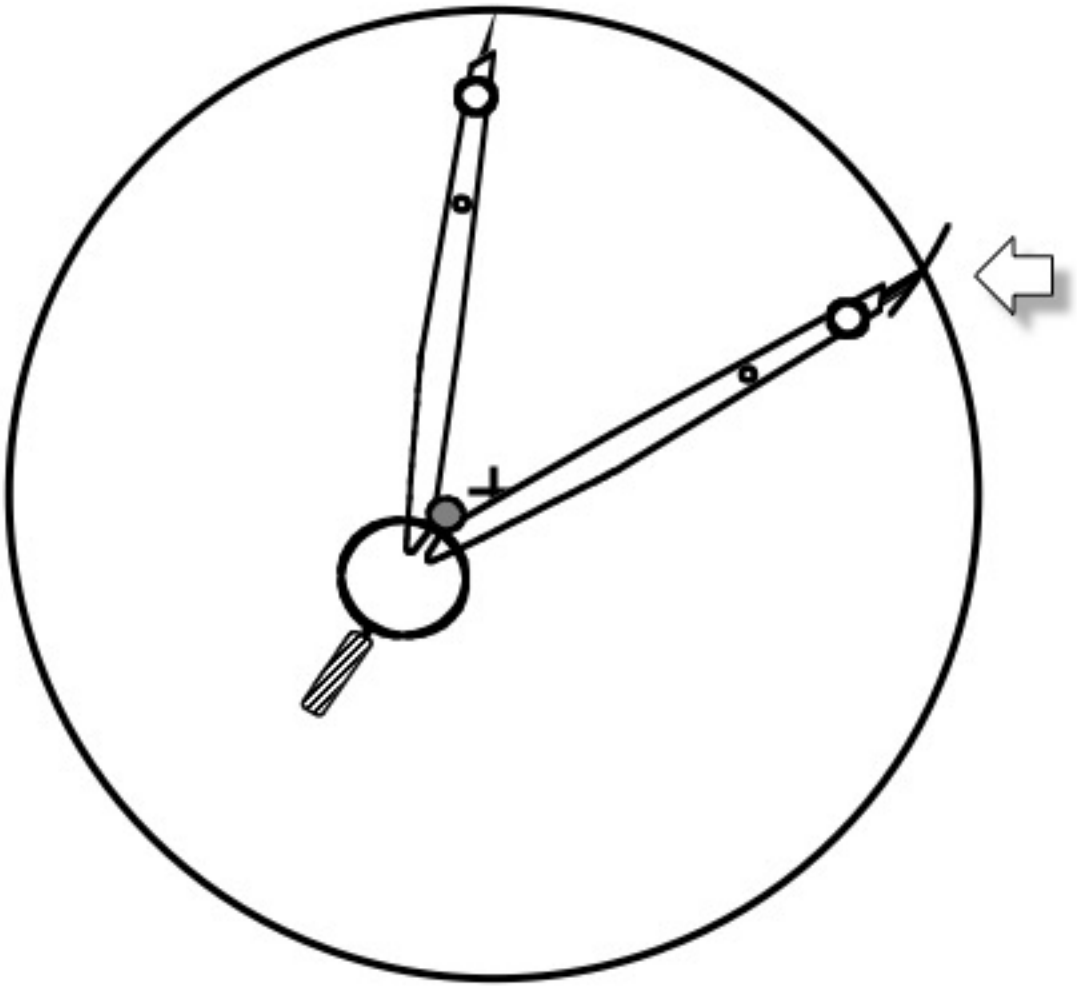
Martin Gardner

To Draw a Hexagon:



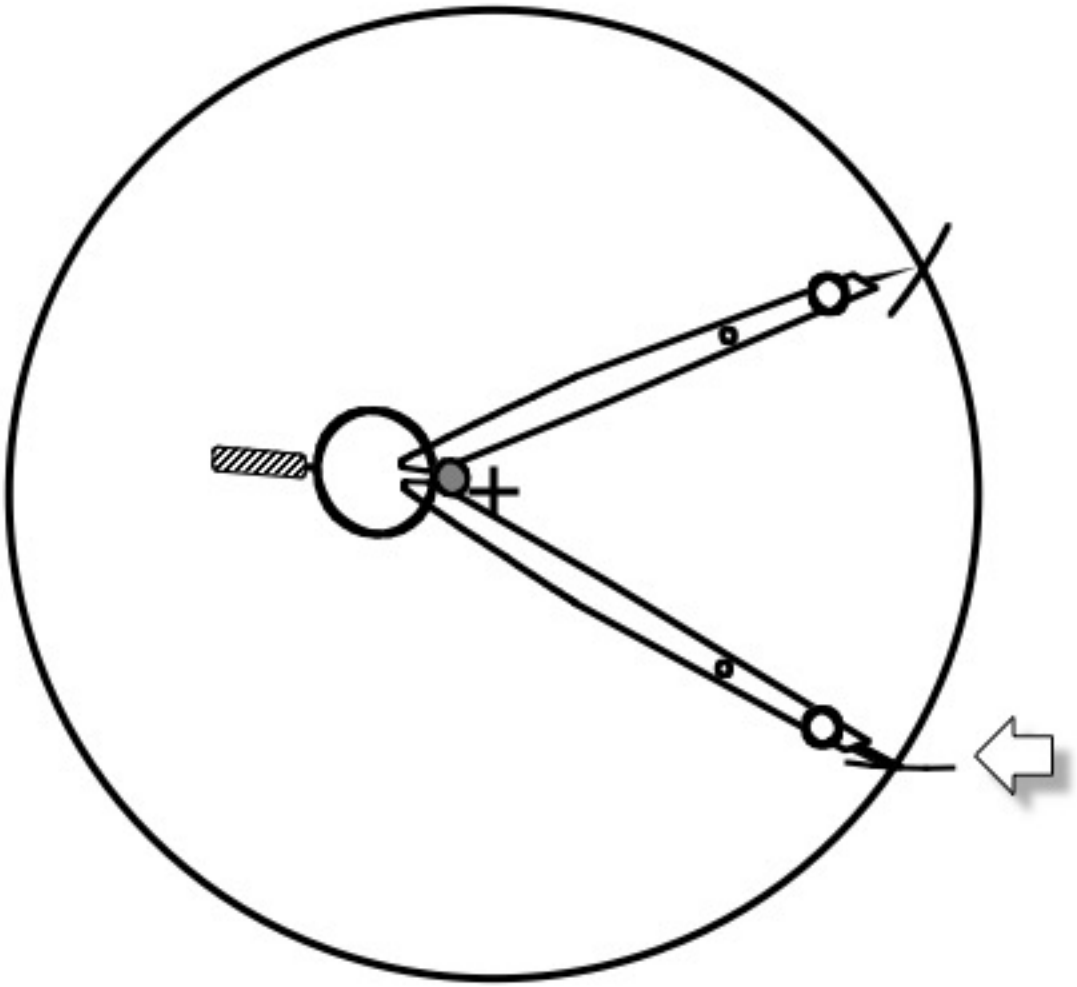
Using a compass, draw a circle. Mark the center. Make sure you keep this measure on the compass.

To Draw a Hexagon:



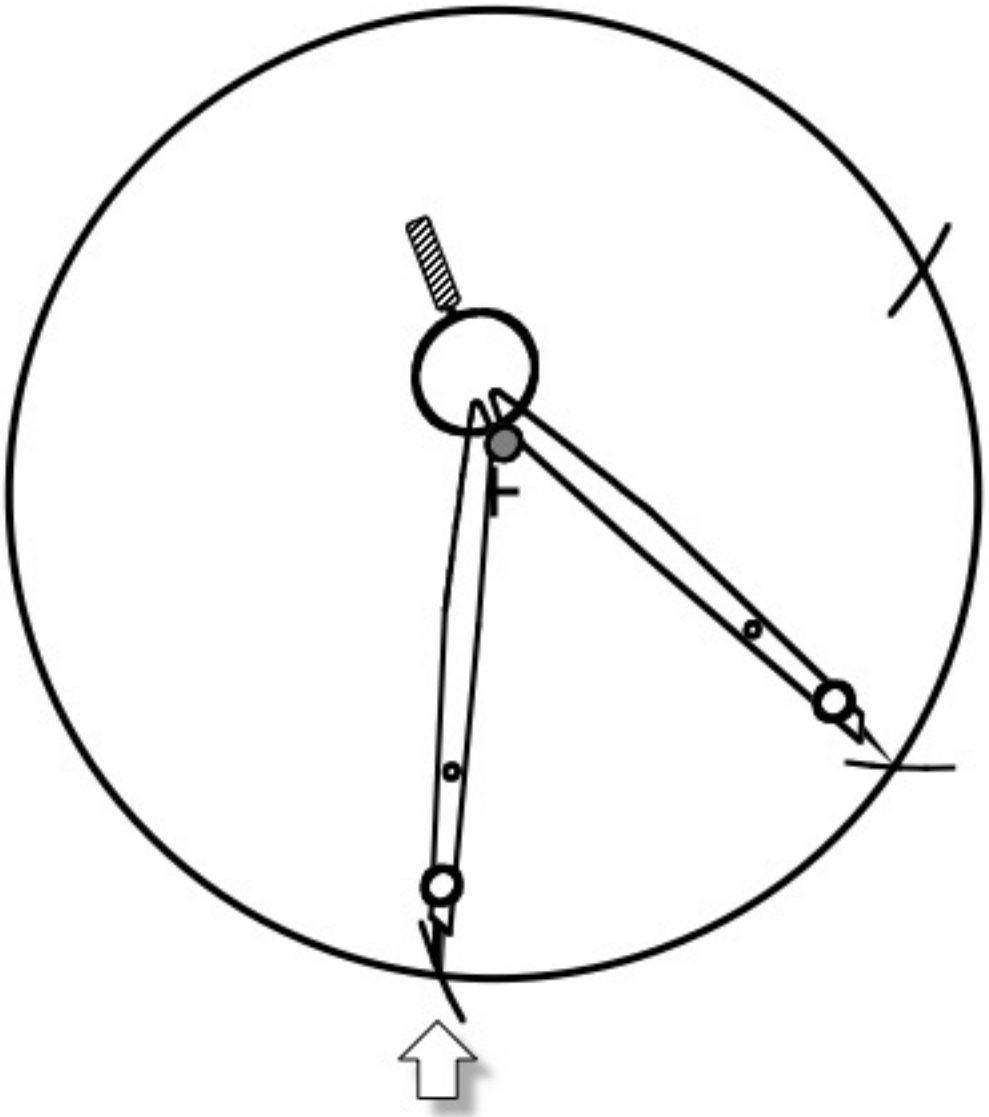
Place the compass point on the circle; scribe a small arc.

To Draw a Hexagon:



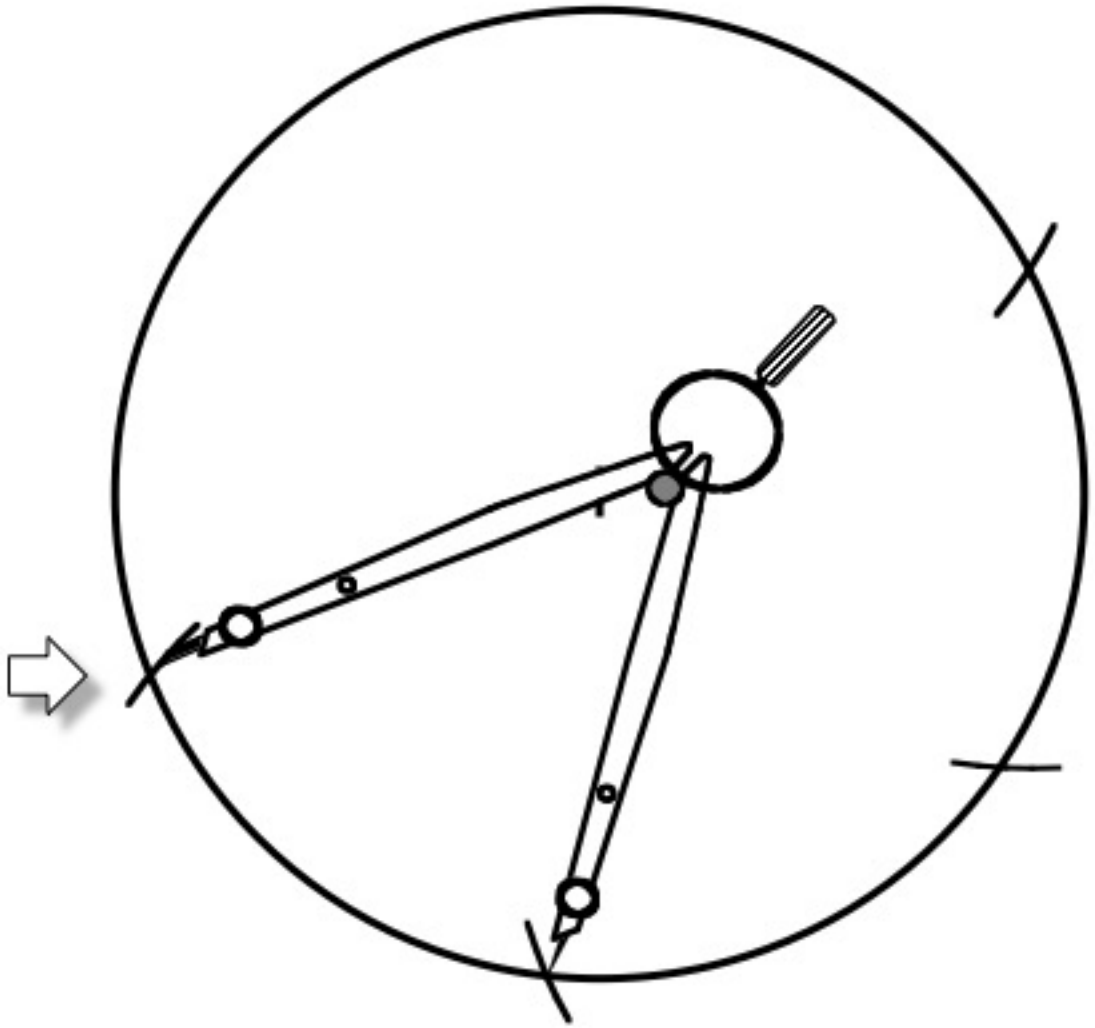
Move the point to where the arc crosses the circle; scribe another arc.

To Draw a Hexagon:



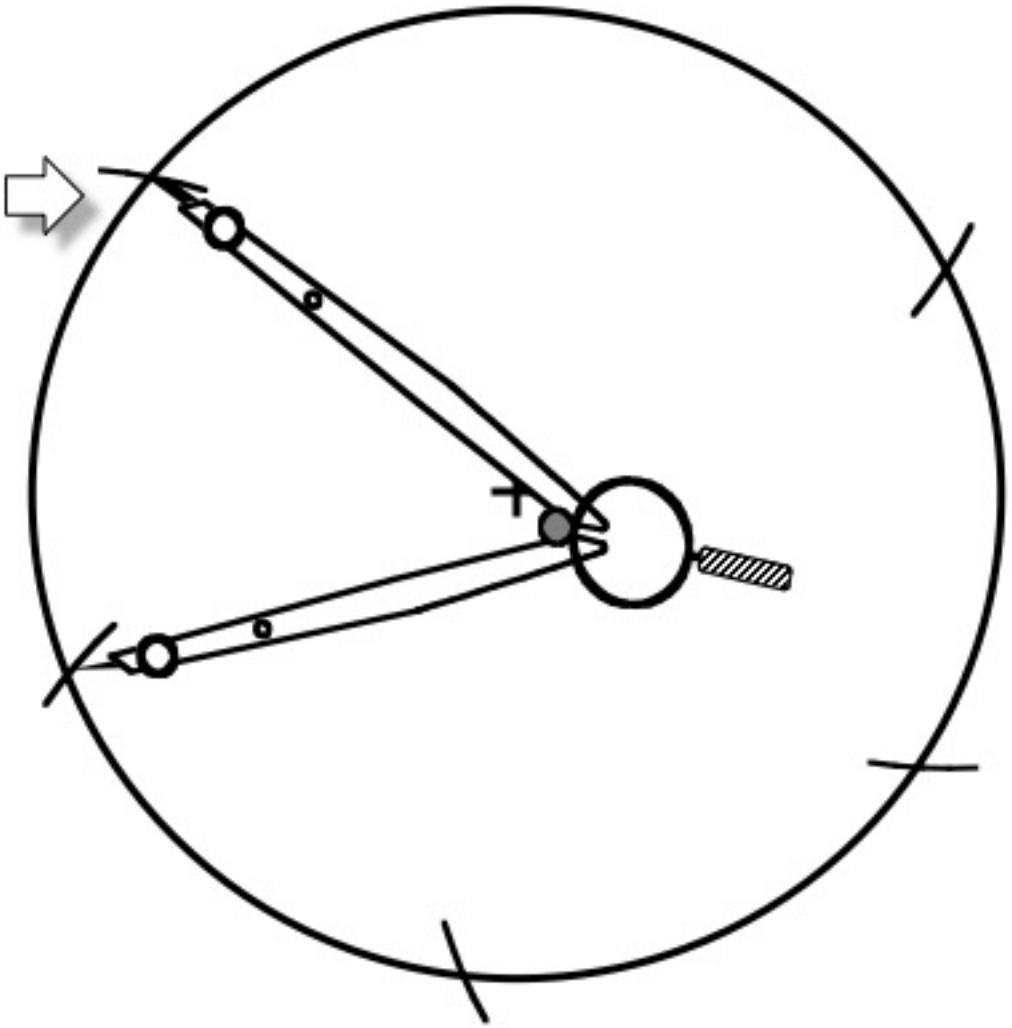
And again…

To Draw a Hexagon:



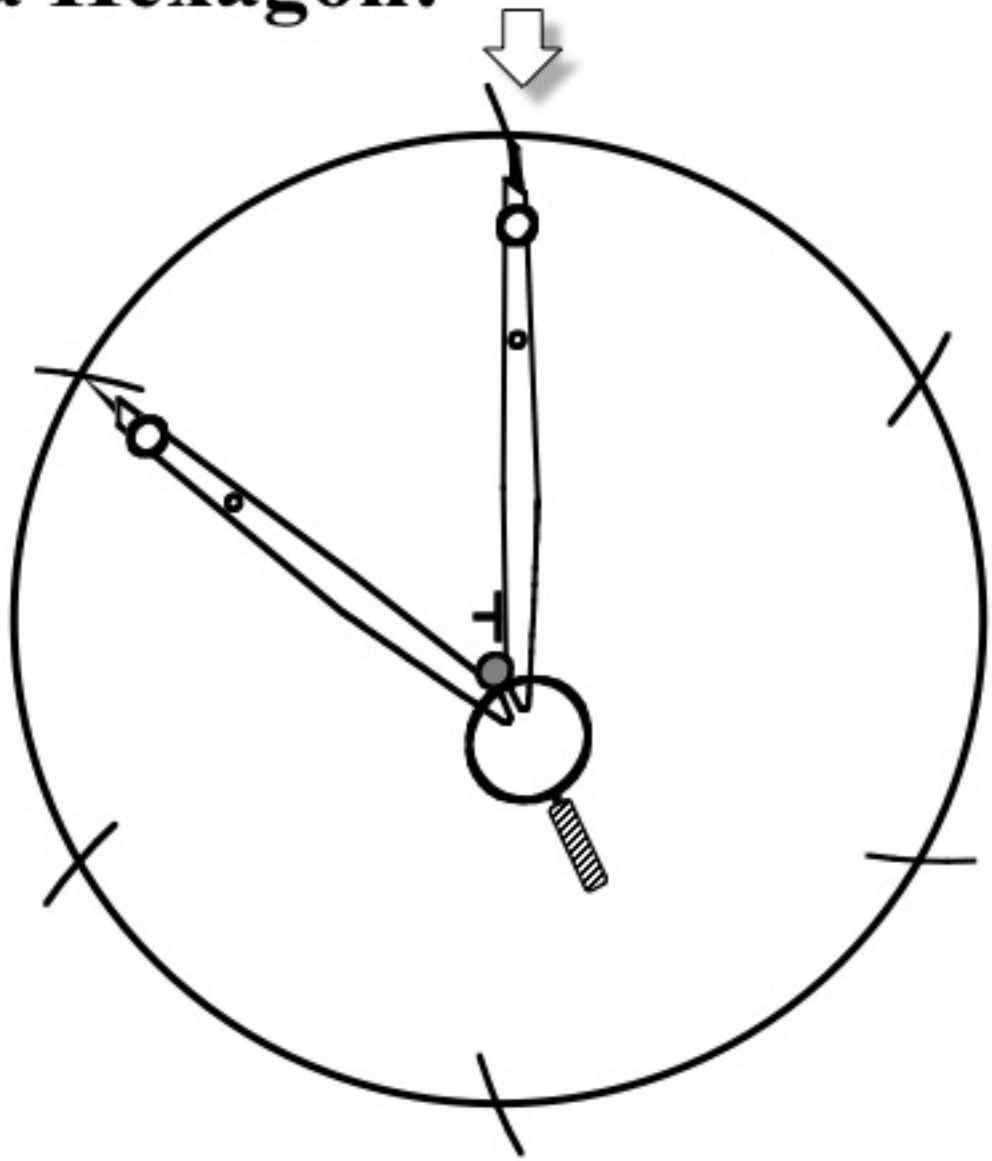
And again…

To Draw a Hexagon:



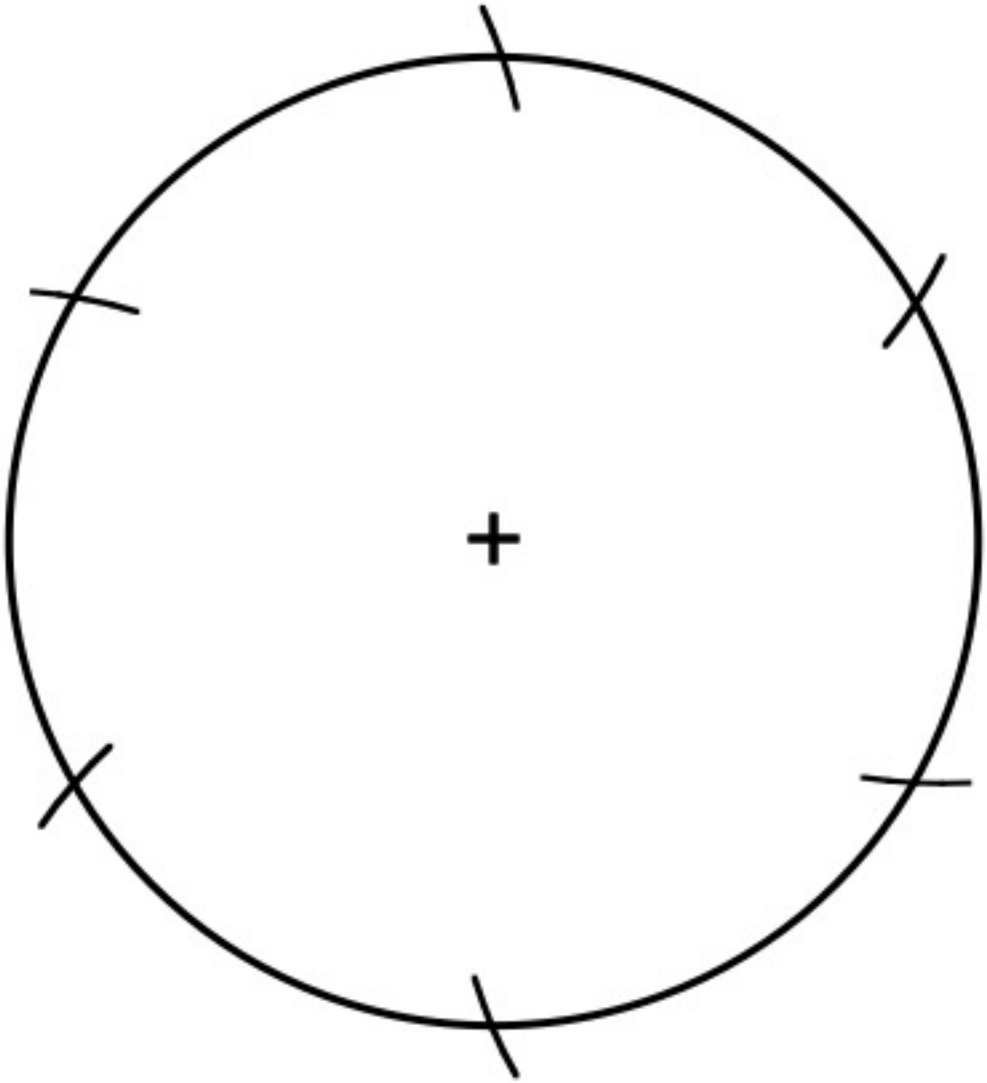
And again…

To Draw a Hexagon:



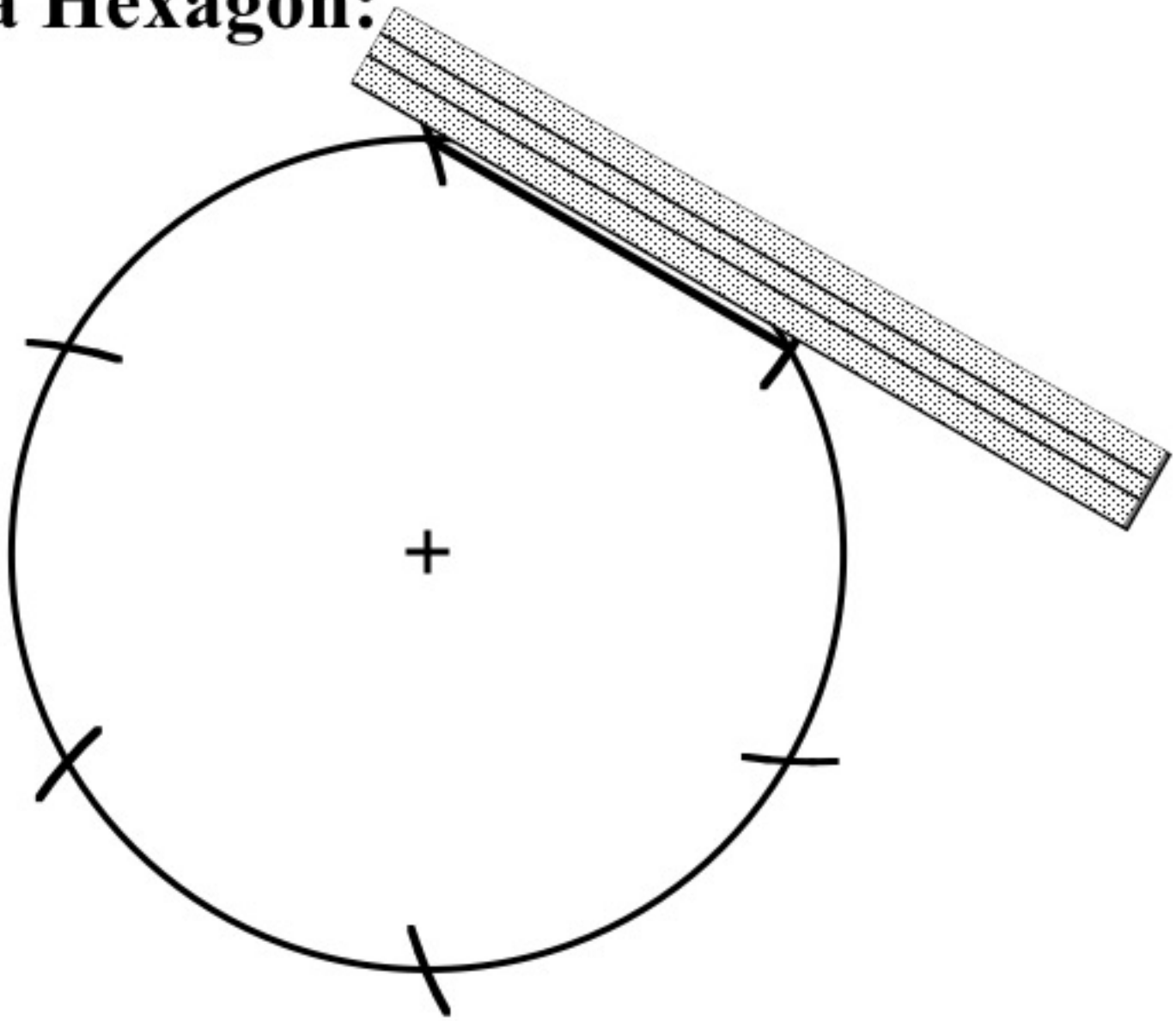
And again one last time. You should end up right where you began!

To Draw a Hexagon:



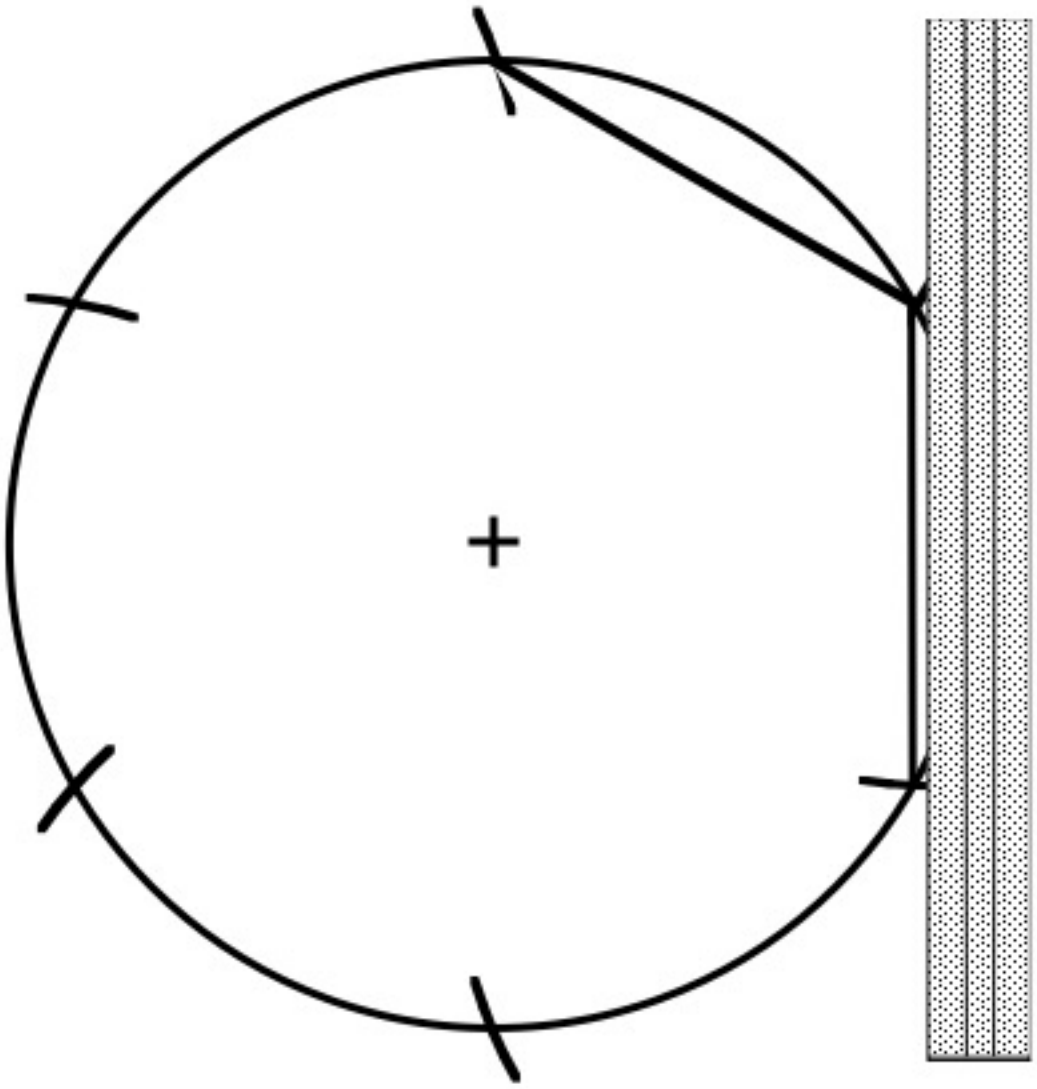
Where the arcs meet the circle will be the six points on the hexagon.

To Draw a Hexagon:



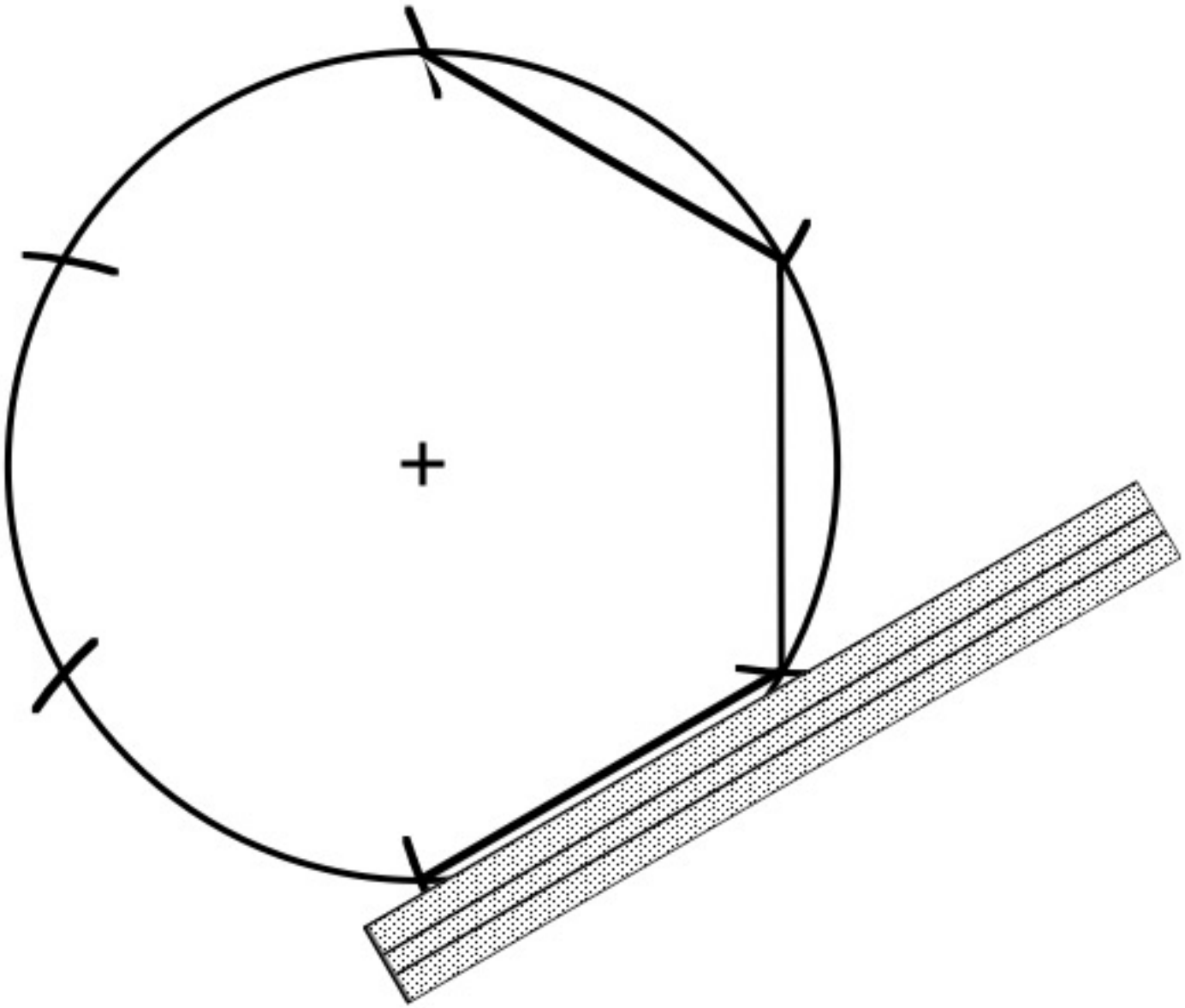
Use a ruler or straight-edge to connect adjacent points with a line.

To Draw a Hexagon:



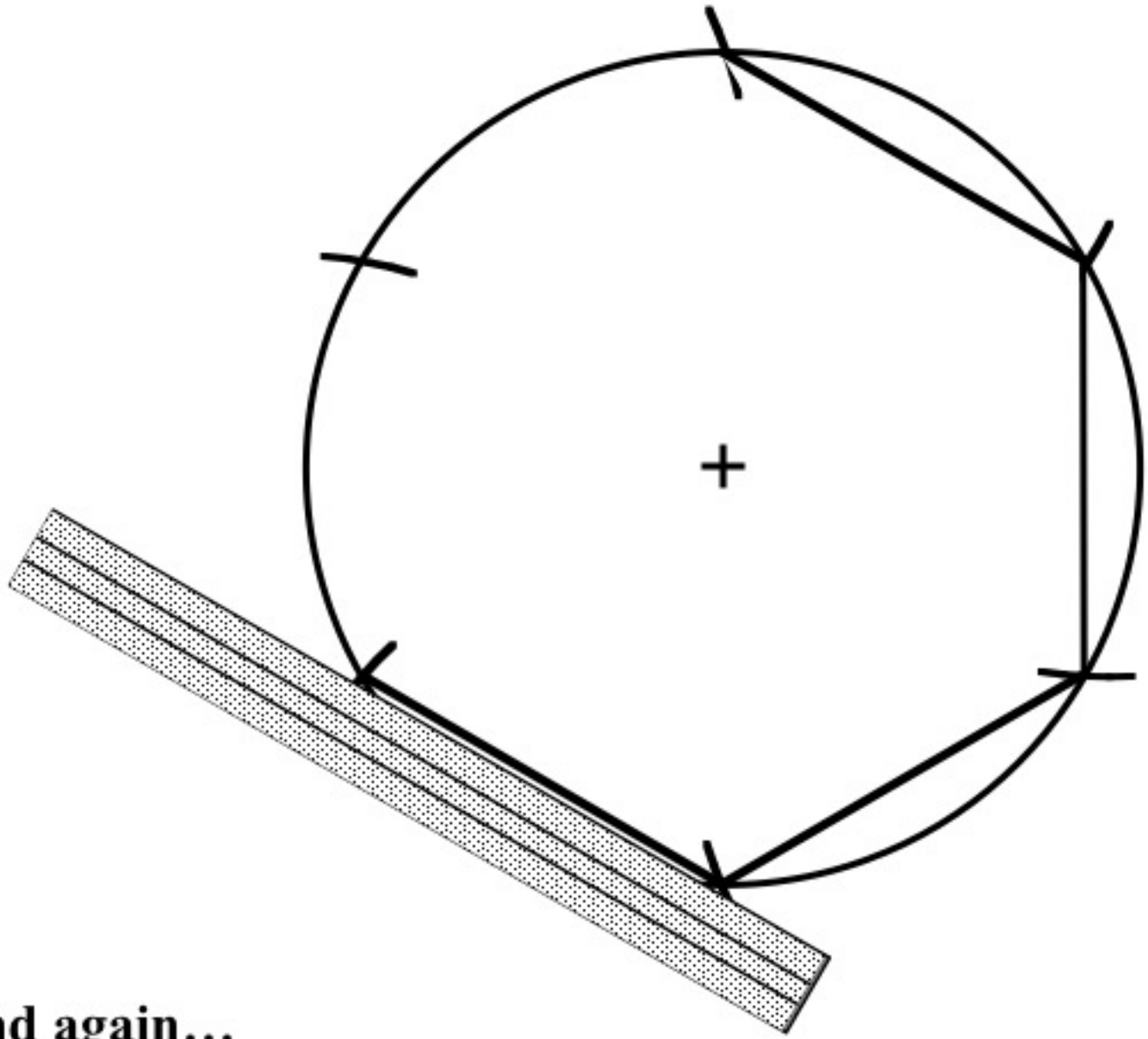
And again…

To Draw a Hexagon:



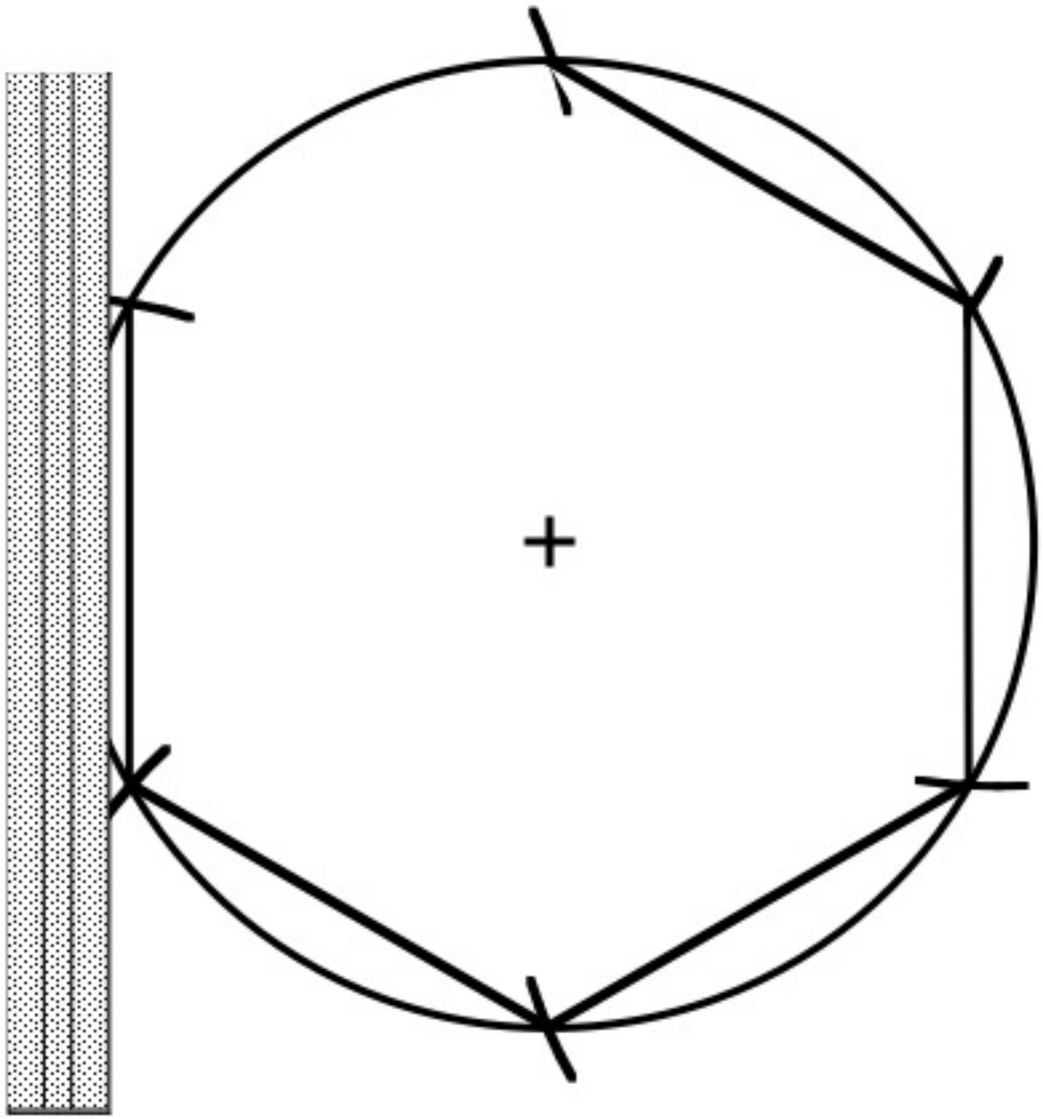
And again…

To Draw a Hexagon:



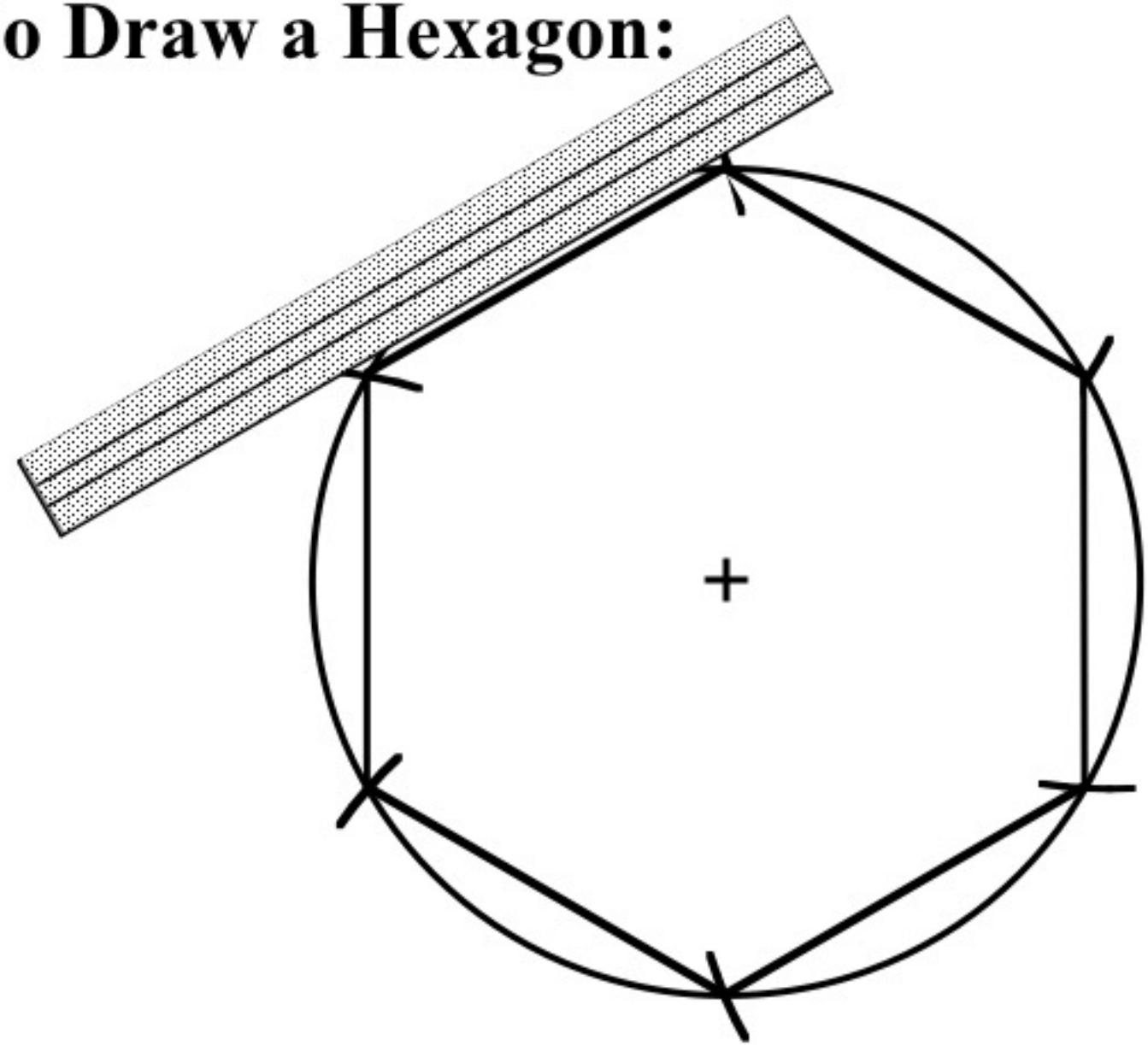
And again…

To Draw a Hexagon:



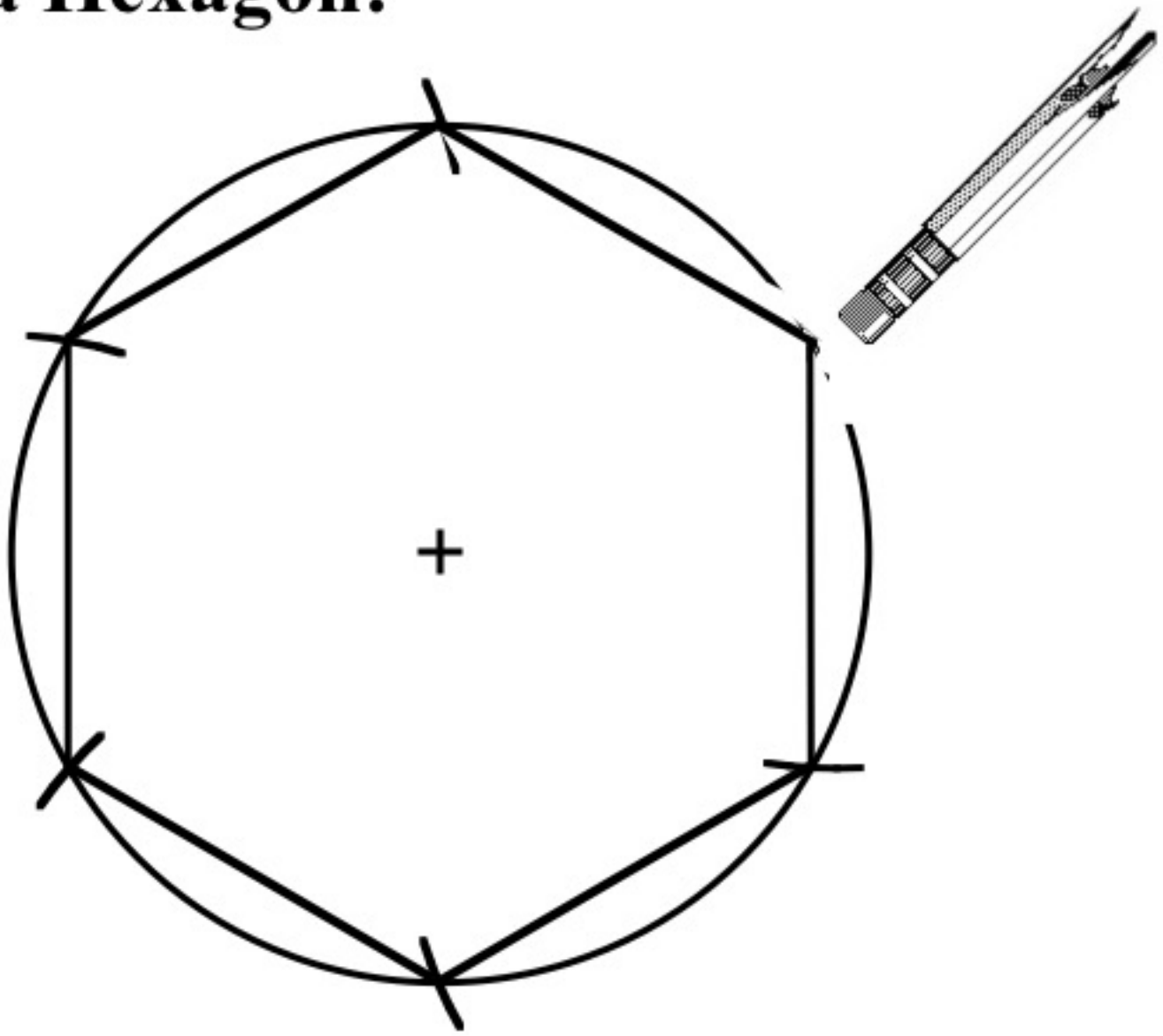
And again…

To Draw a Hexagon:



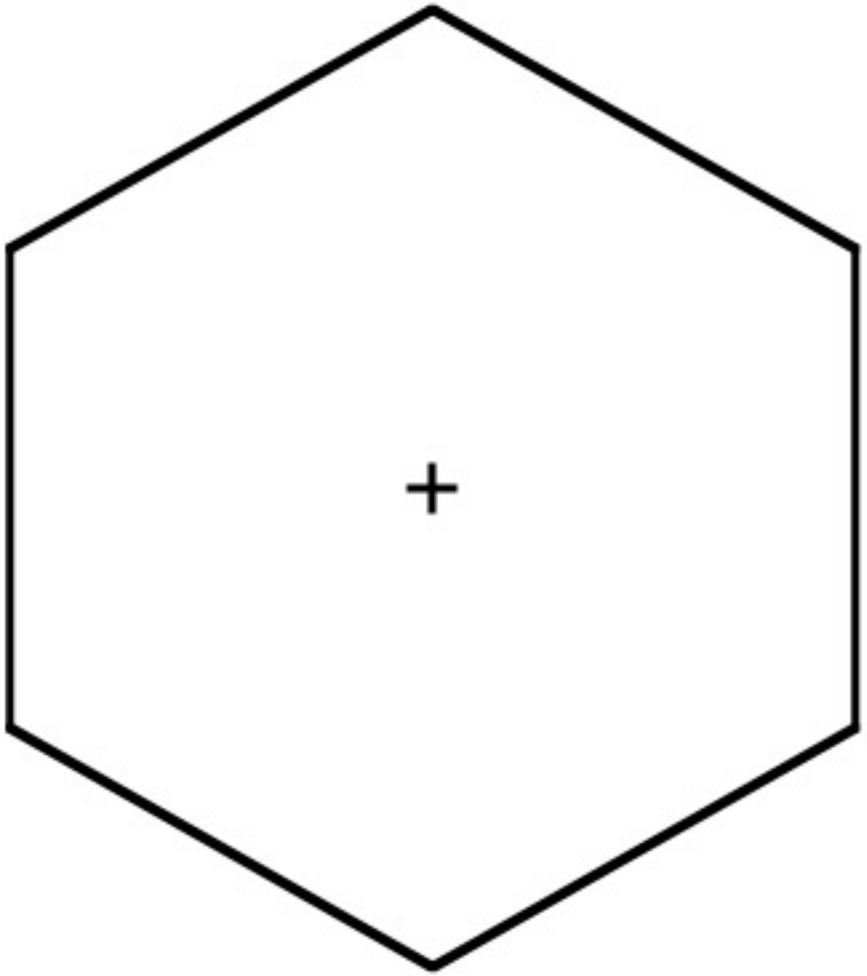
And again one last time. You should end up with a hexagon!

To Draw a Hexagon:



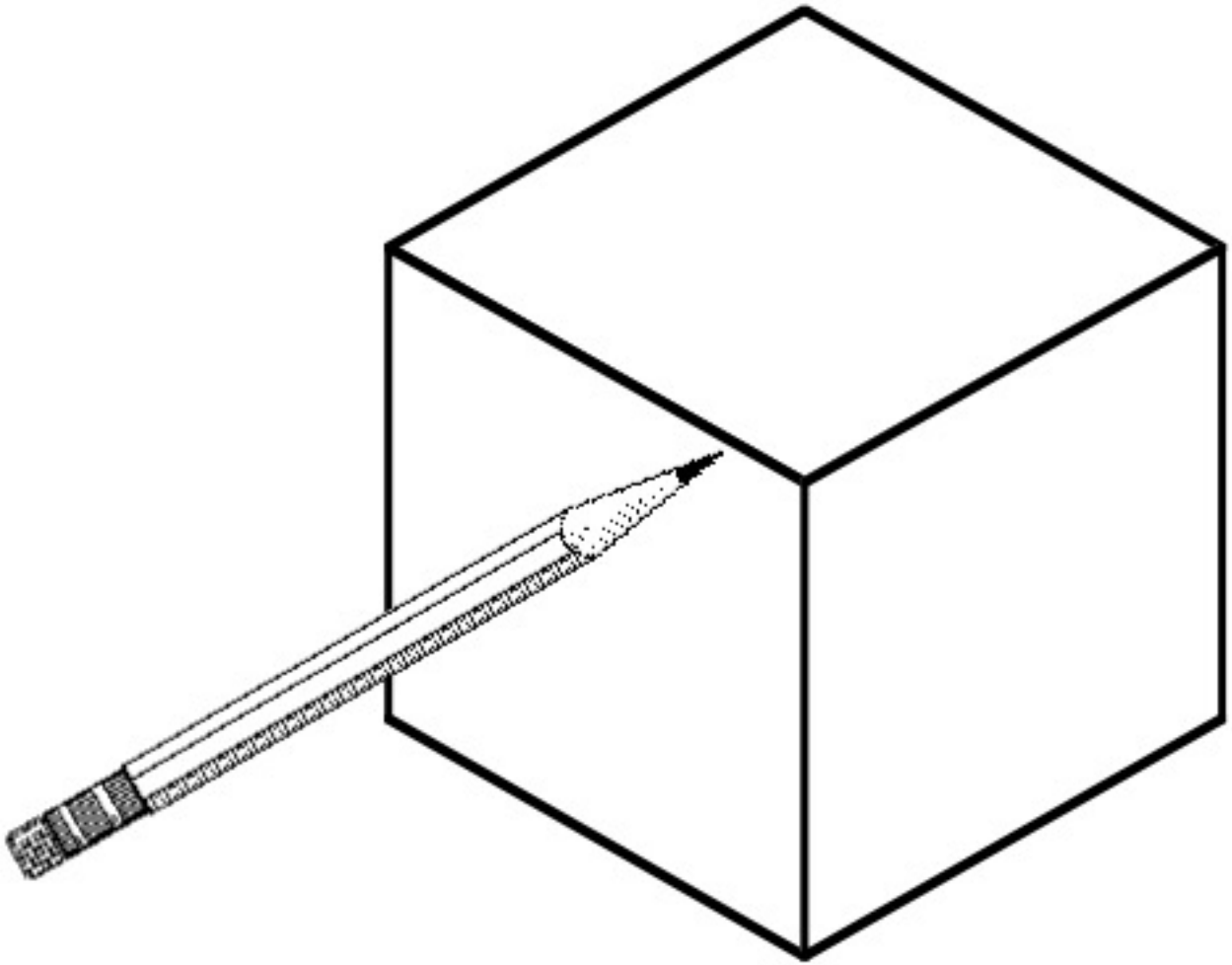
Carefully erase the circle and the 6 arc. Don't erase the center.

To Draw a Hexagon:



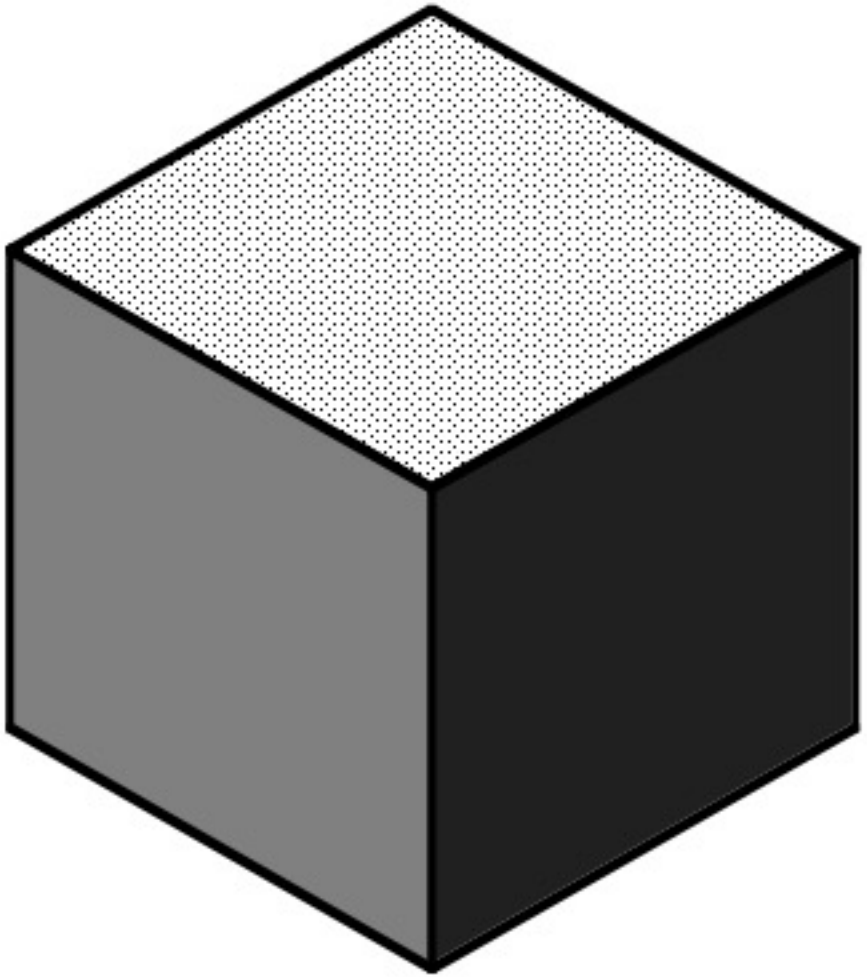
This hexagon can be the basis of several 3-D optical illusions.

To Draw a 3-D Cube:



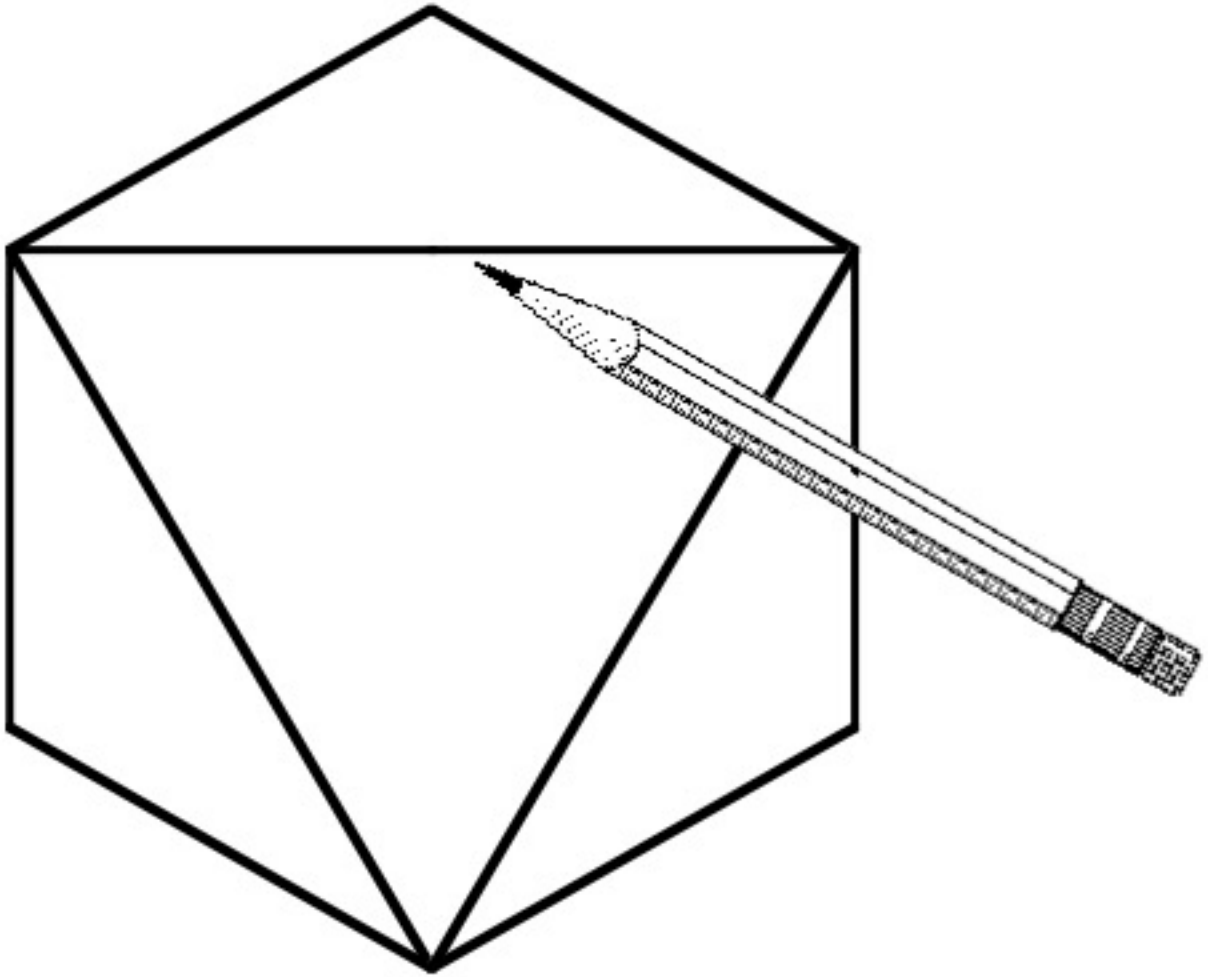
Connect every-other point of the hexigon to the center point.

To Draw a 3-D Cube:



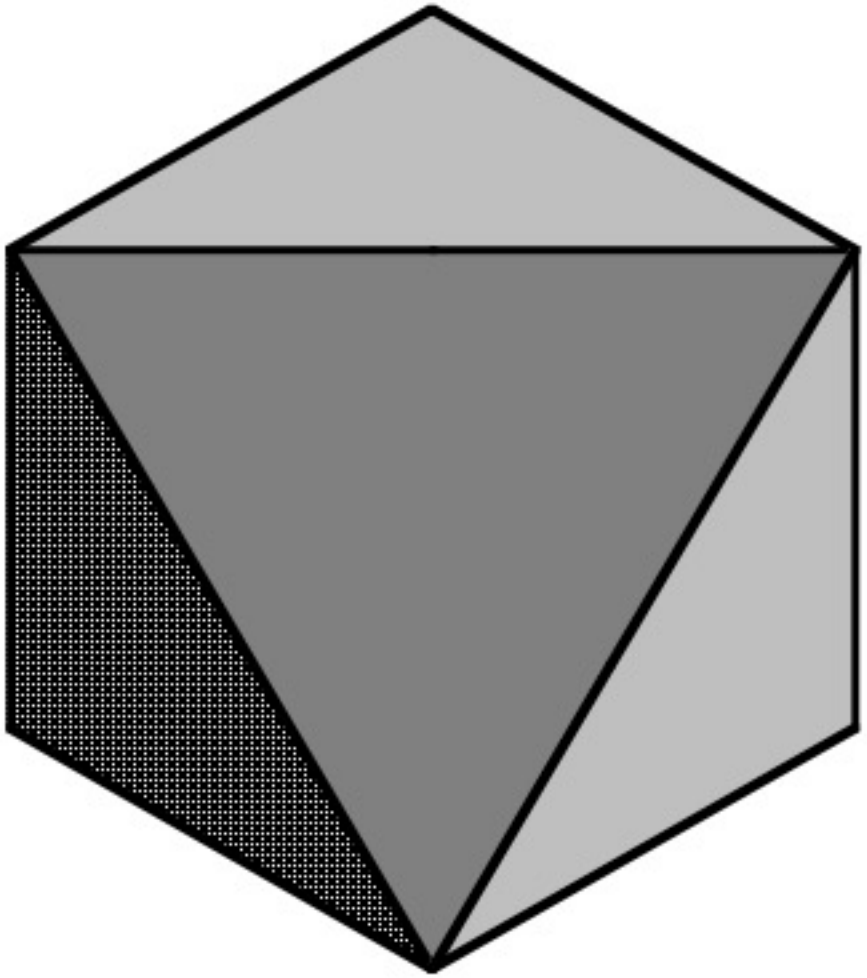
Color every rhombus section a different color to bring out depth.

To Draw a 3-D Octahedron:



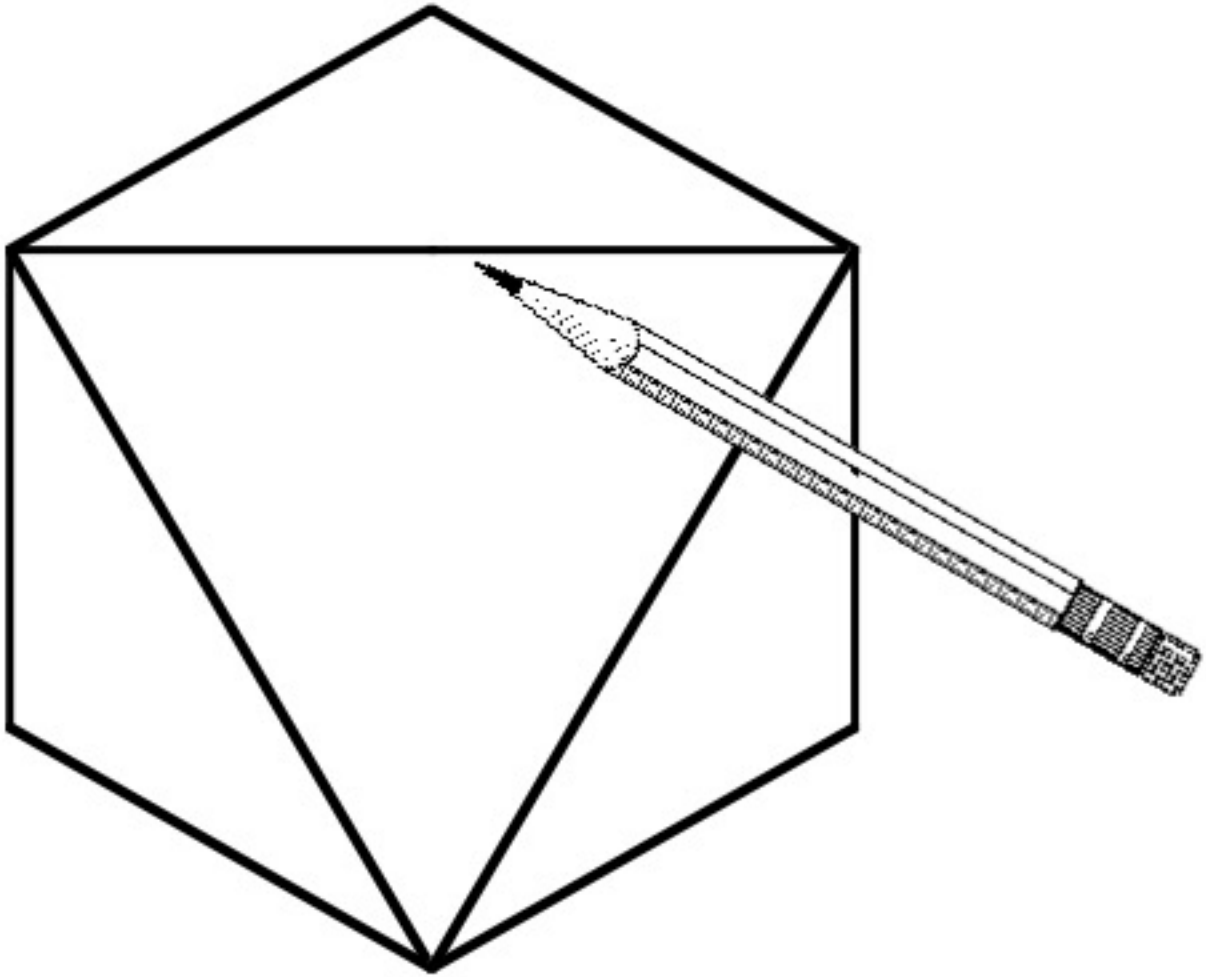
Connect every other point of the hexagon with a straight line.

To Draw a 3-D Octahedron:



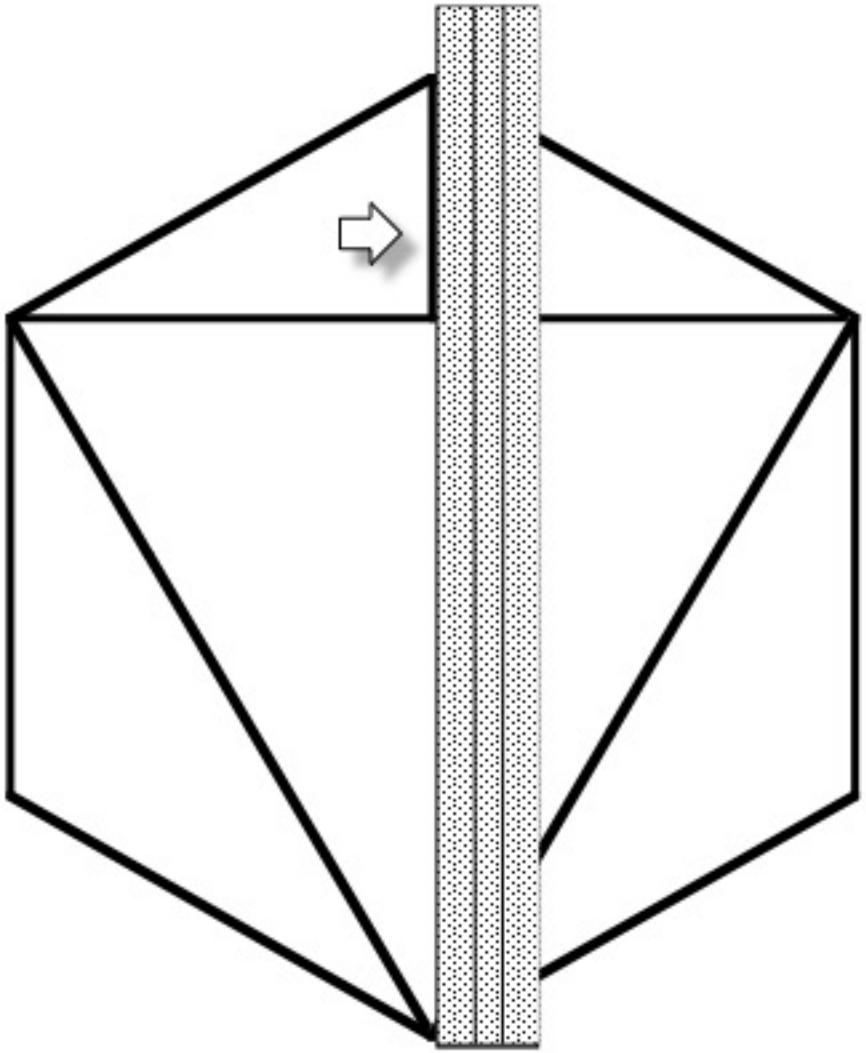
Color every triangular section in a contrasting color.

To Draw a 3-D Icosahedron:



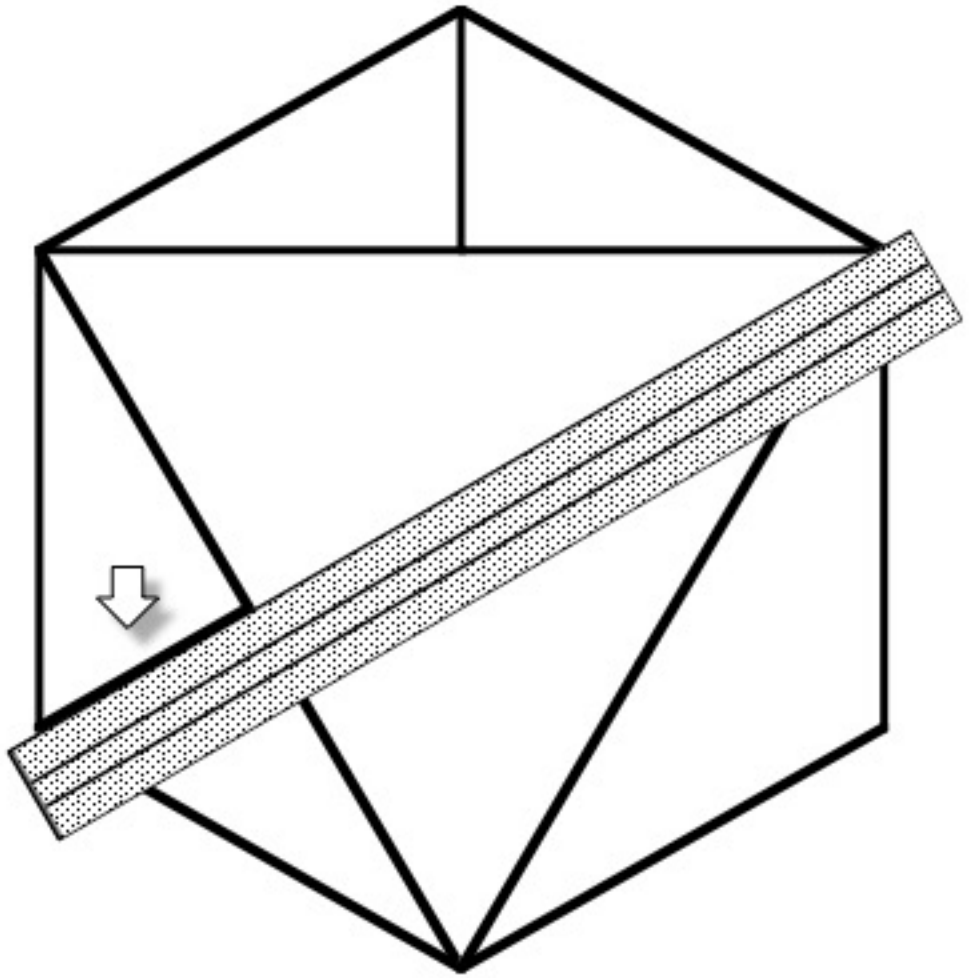
Start with the same skeleton of the octahedron.

To Draw a 3-D Icosahedron:



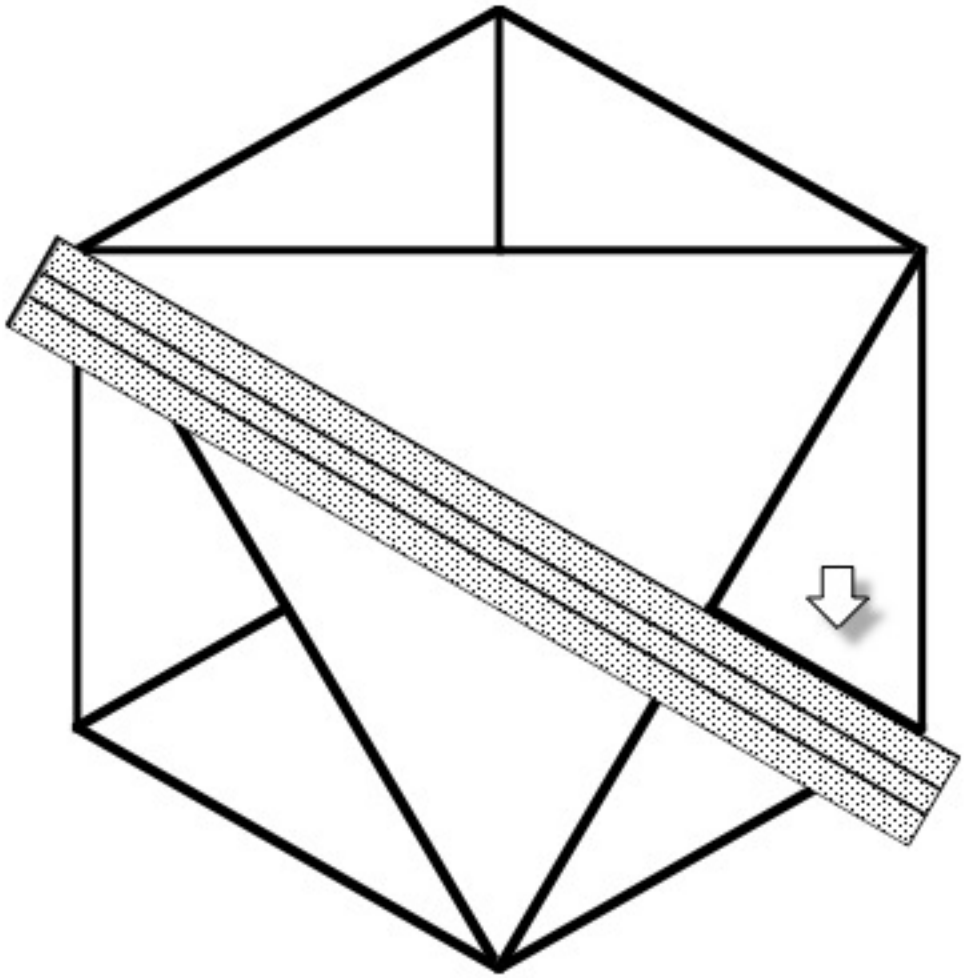
With a ruler, line up opposite corners, then draw a short line as above.

To Draw a 3-D Icosahedron:



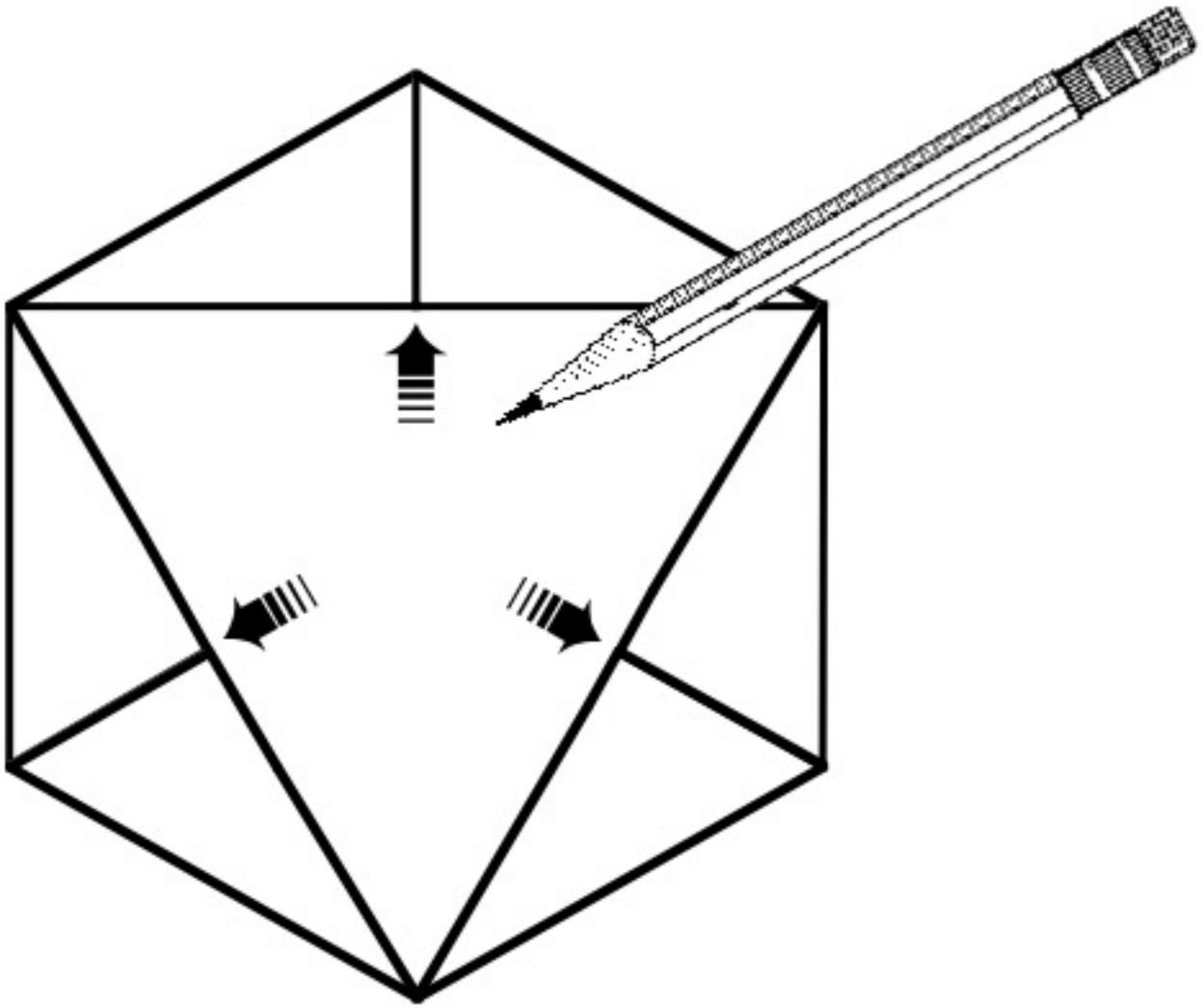
And again…

To Draw a 3-D Icosahedron:



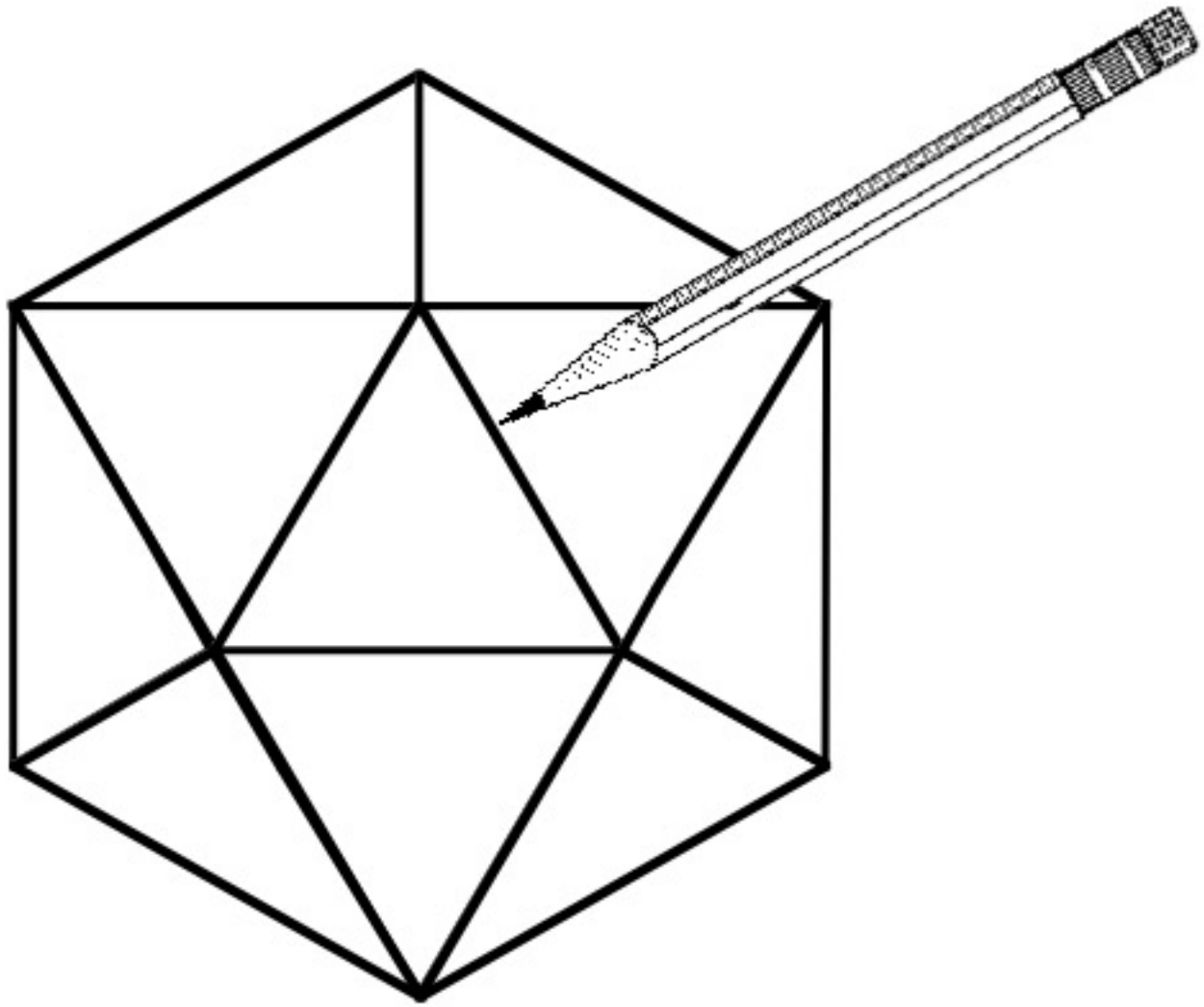
And again…

To Draw a 3-D Icosahedron:



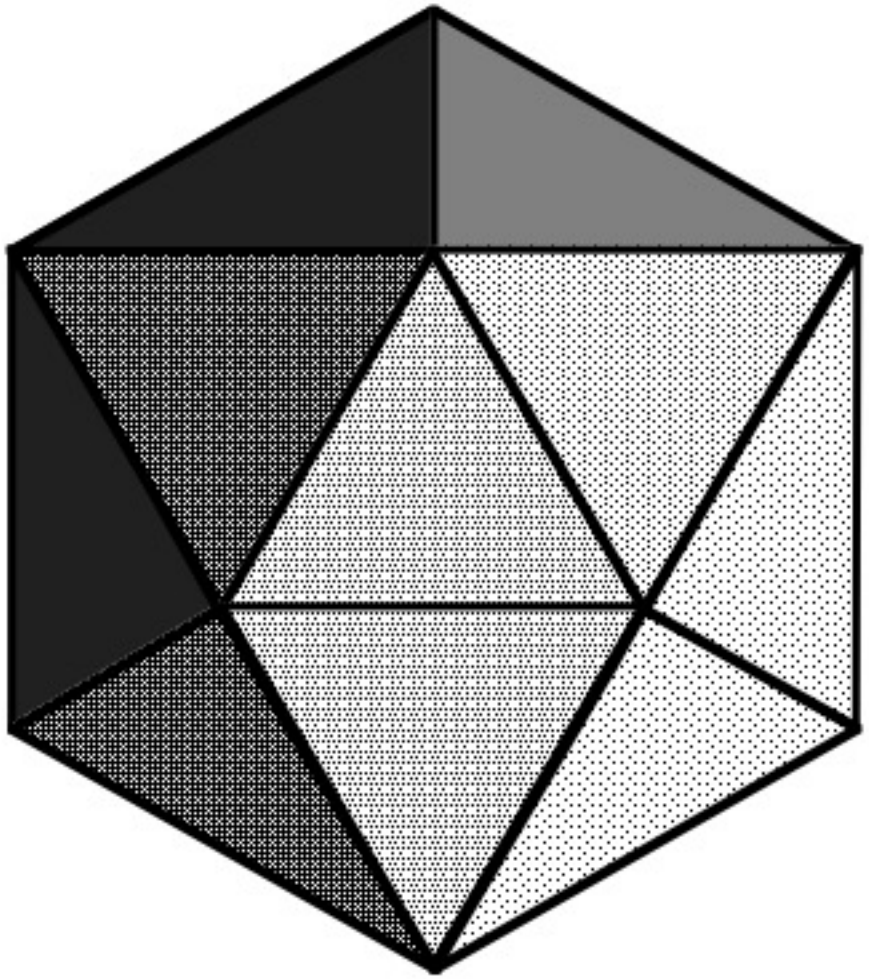
Now use these three points to draw a triangle inside the hexagon.

To Draw a 3-D Icosahedron:



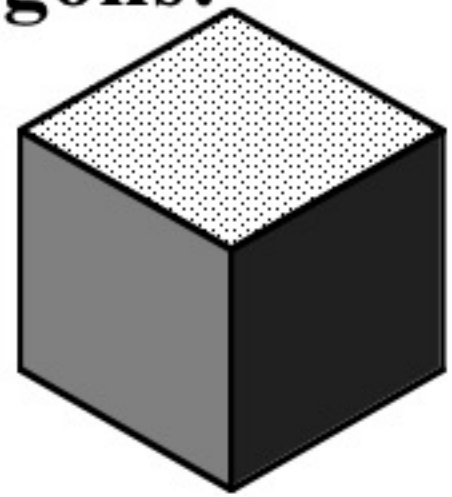
Like this…

To Draw a 3-D Icosahedron:

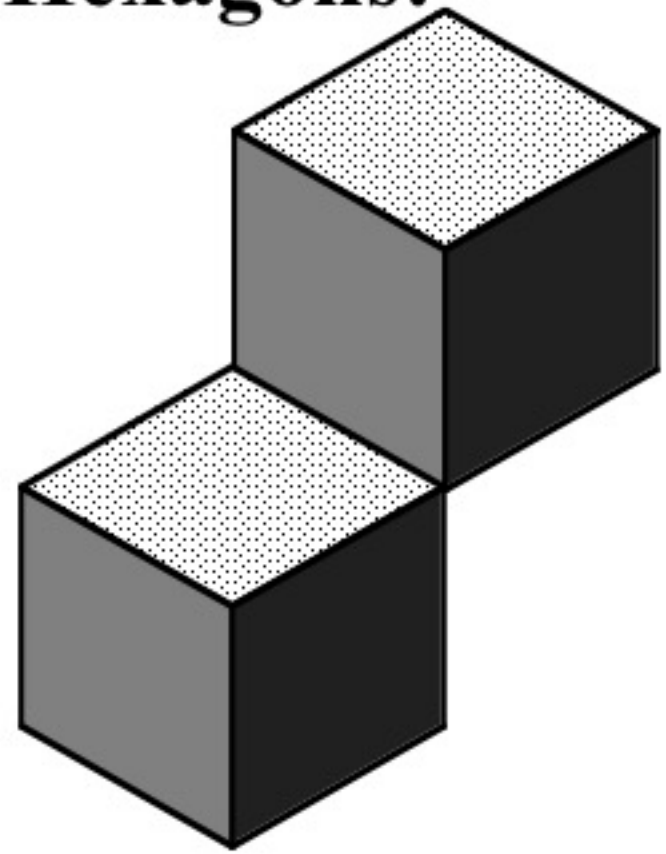


Color the triangles with contrasting shades. Can you see it?

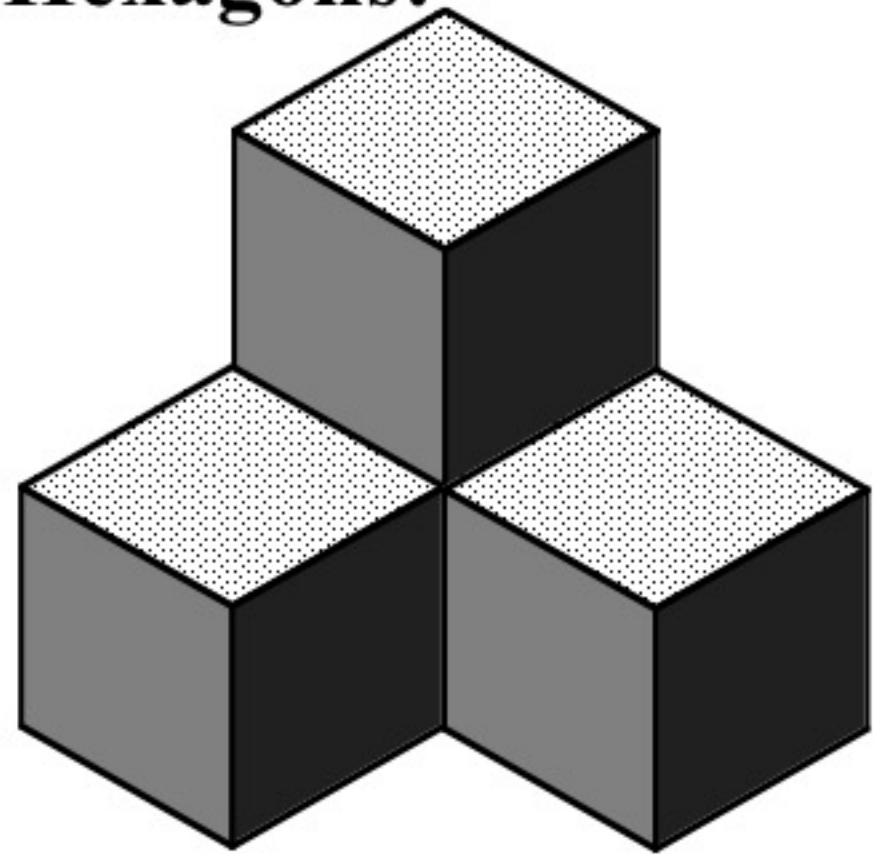
Tiling With Hexagons:



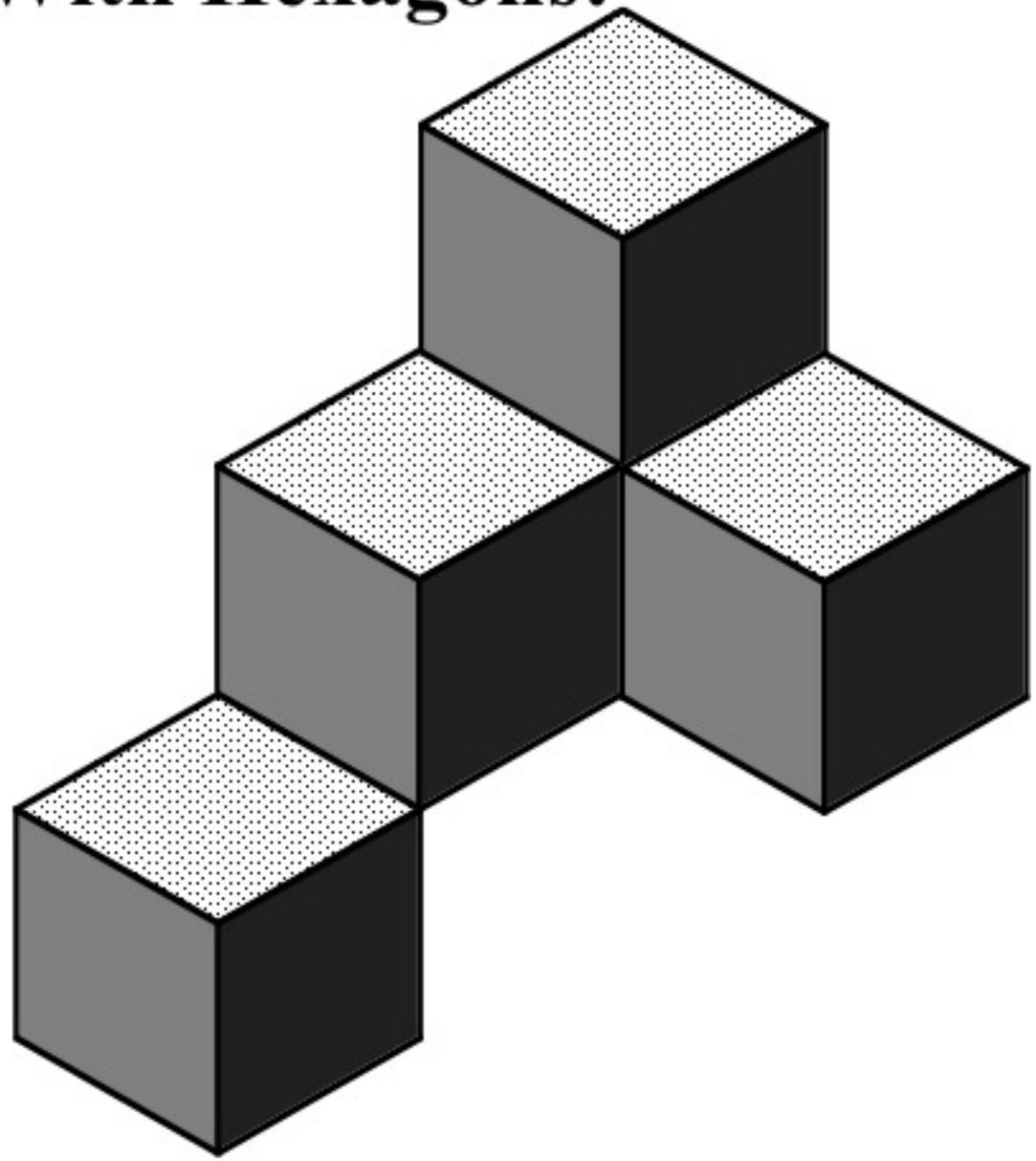
Tiling With Hexagons:



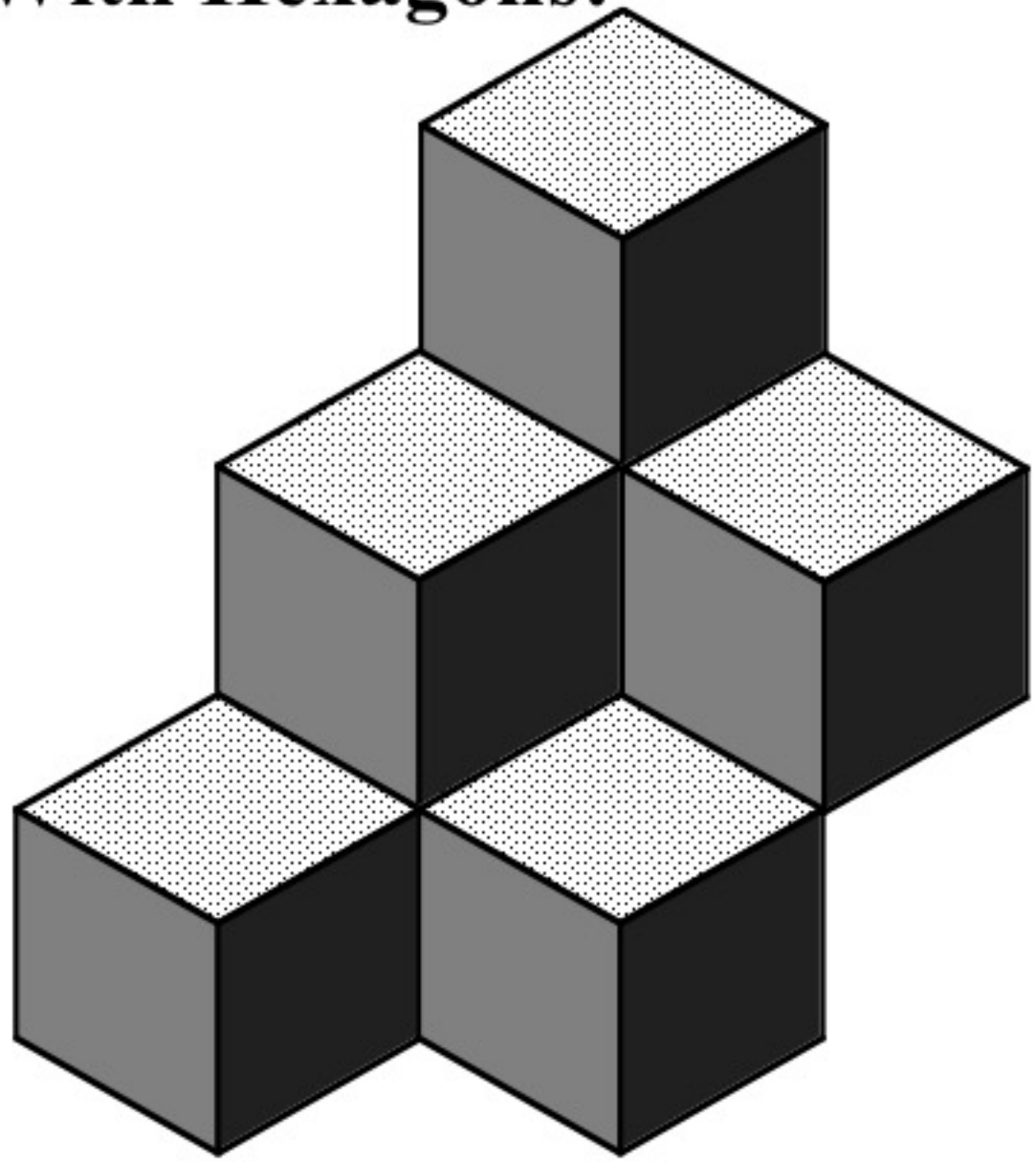
Tiling With Hexagons:



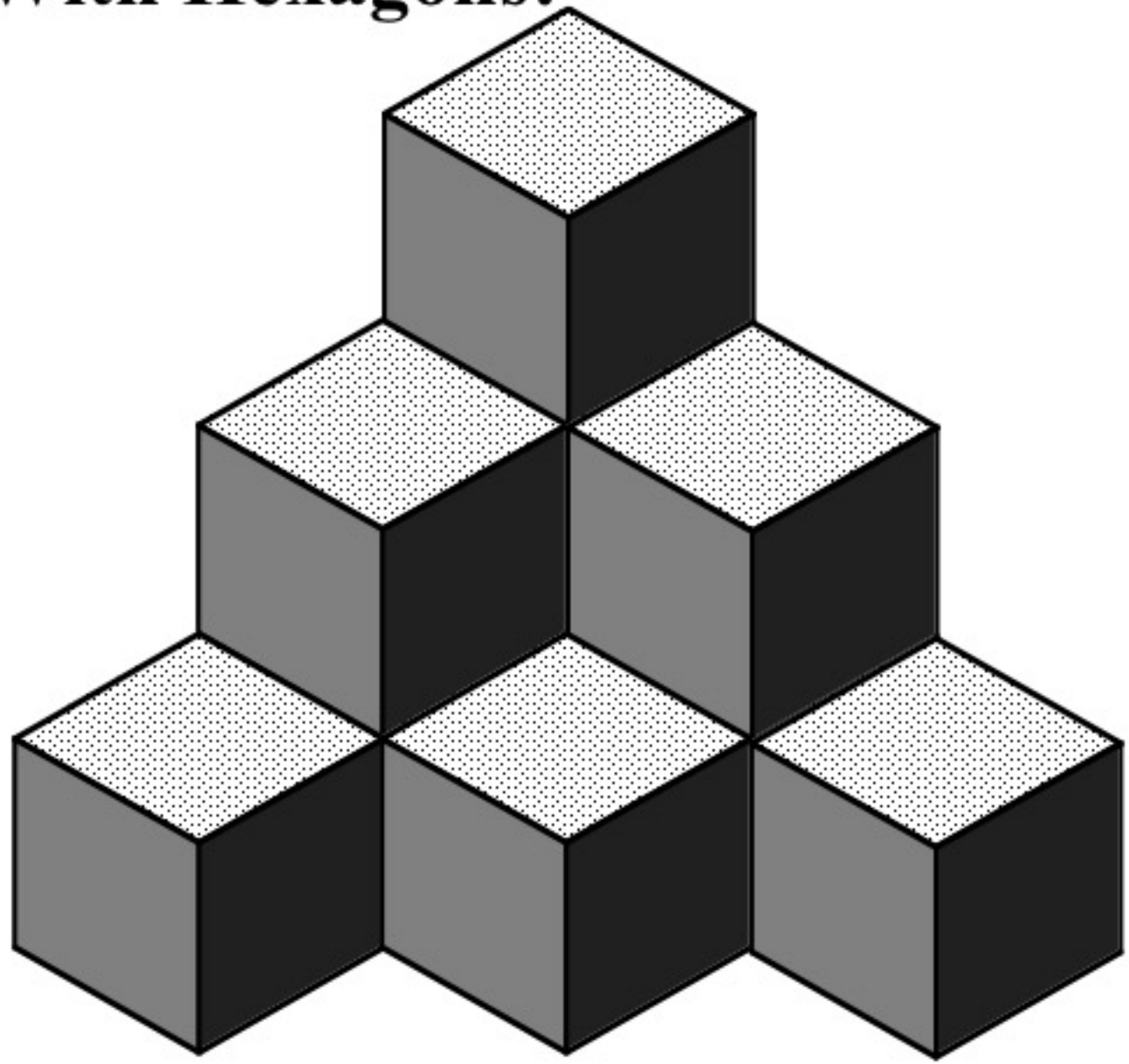
Tiling With Hexagons:

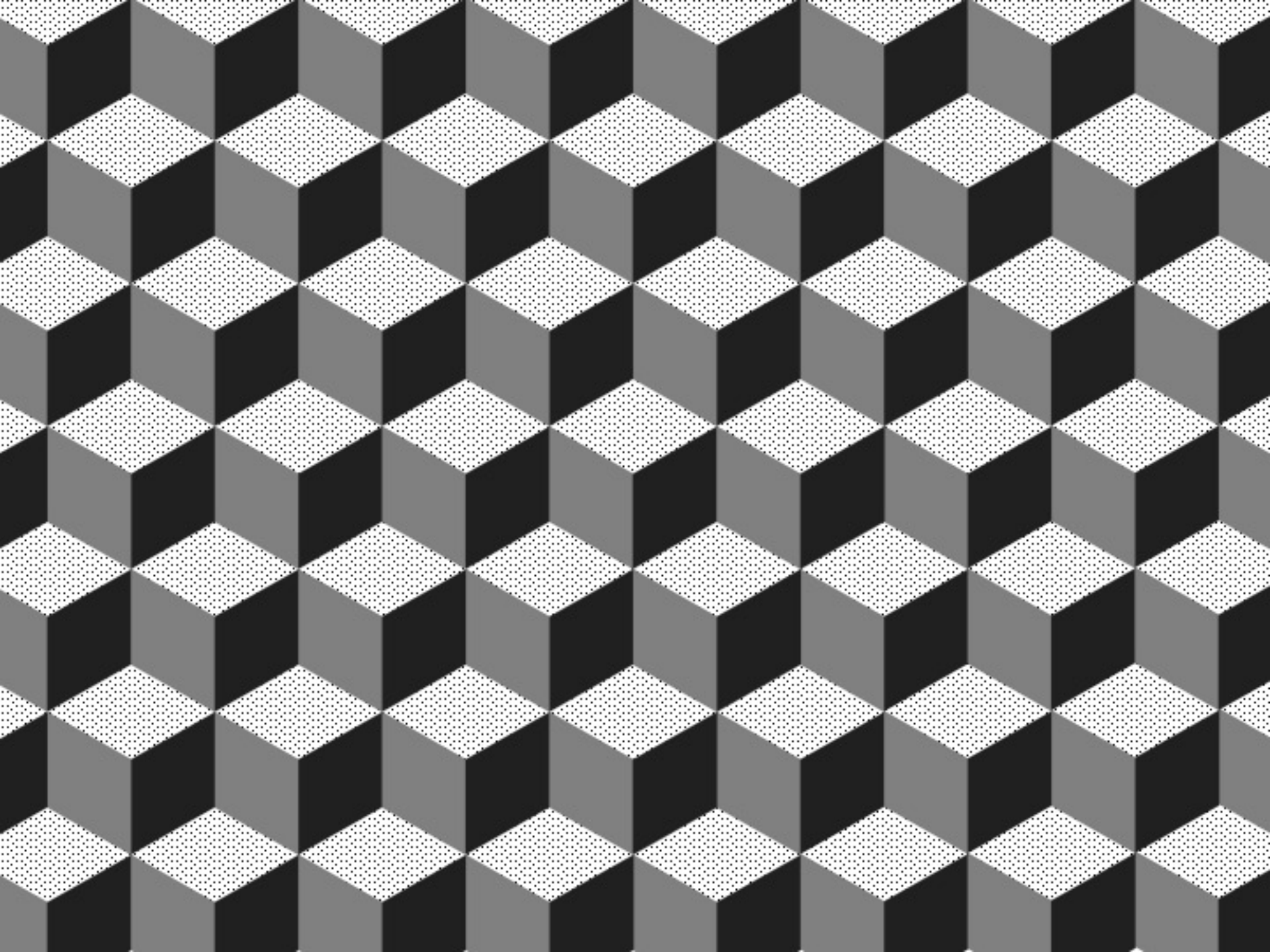


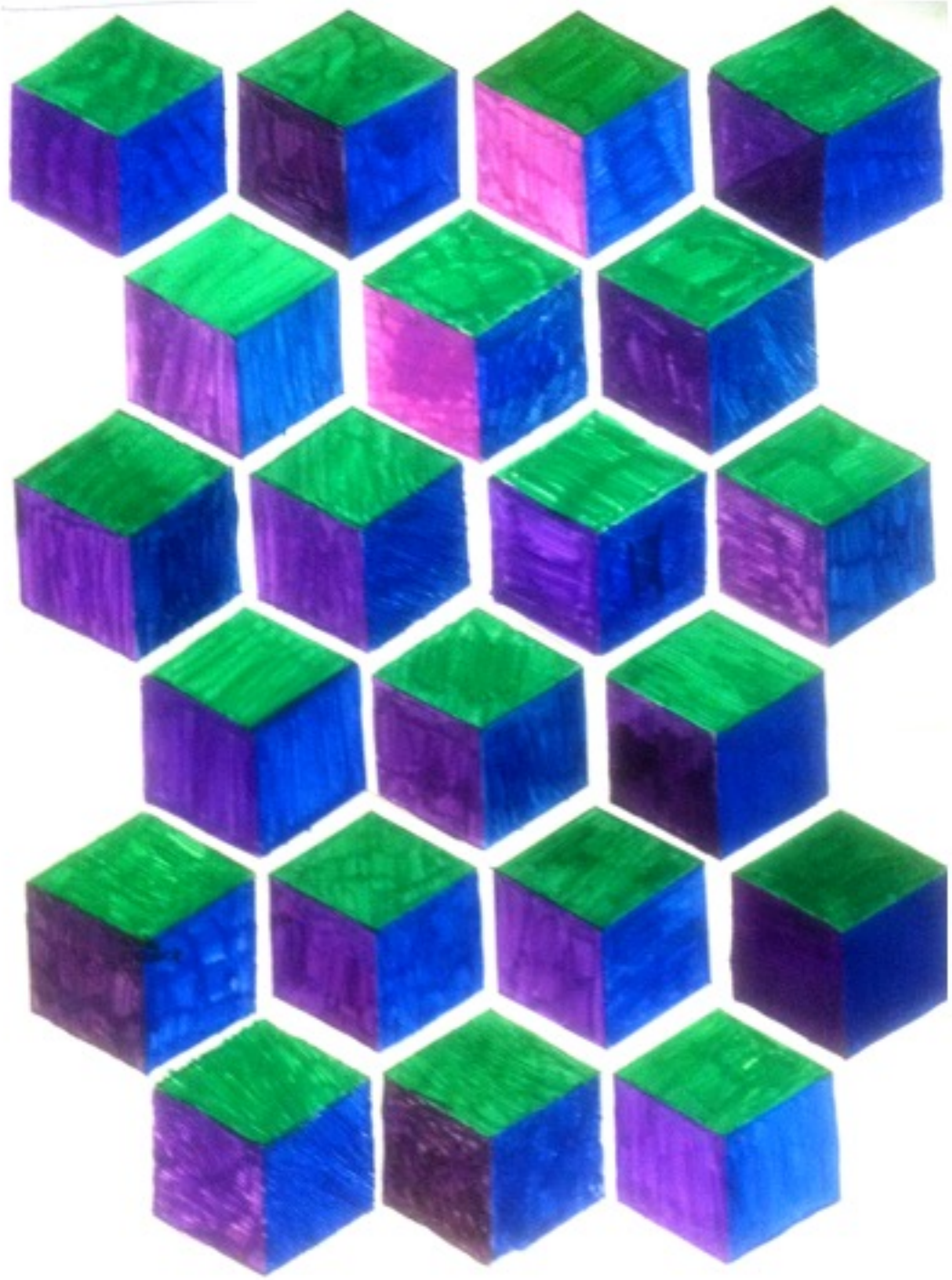
Tiling With Hexagons:



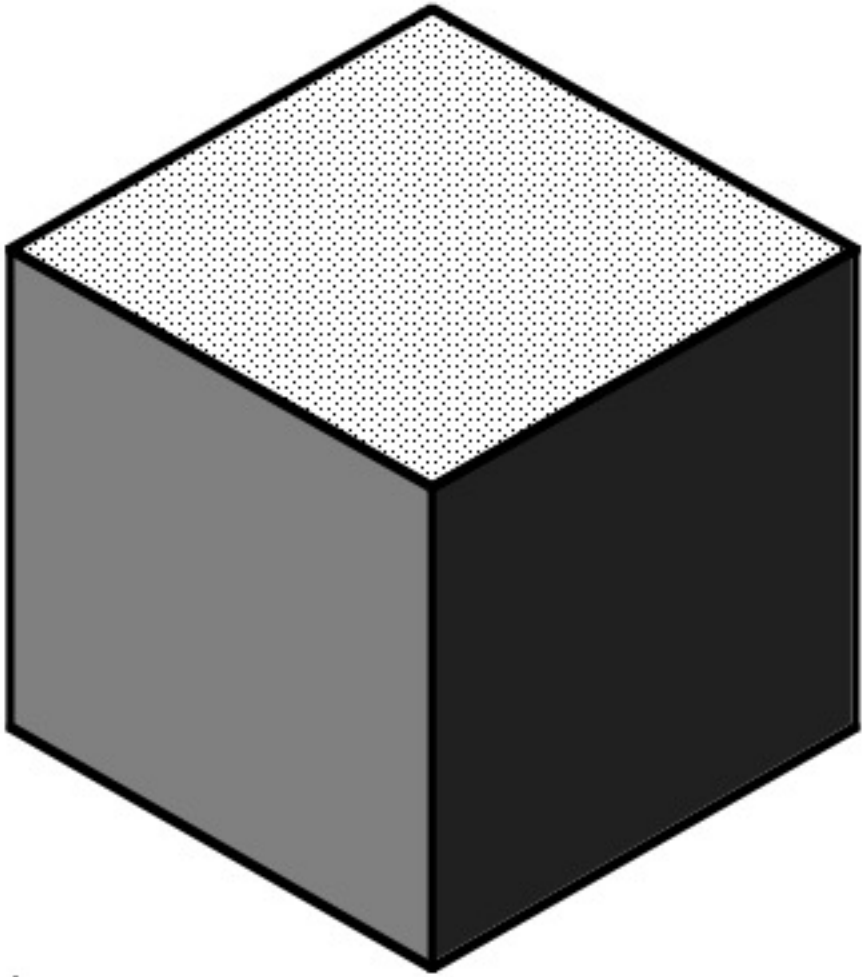
Tiling With Hexagons:

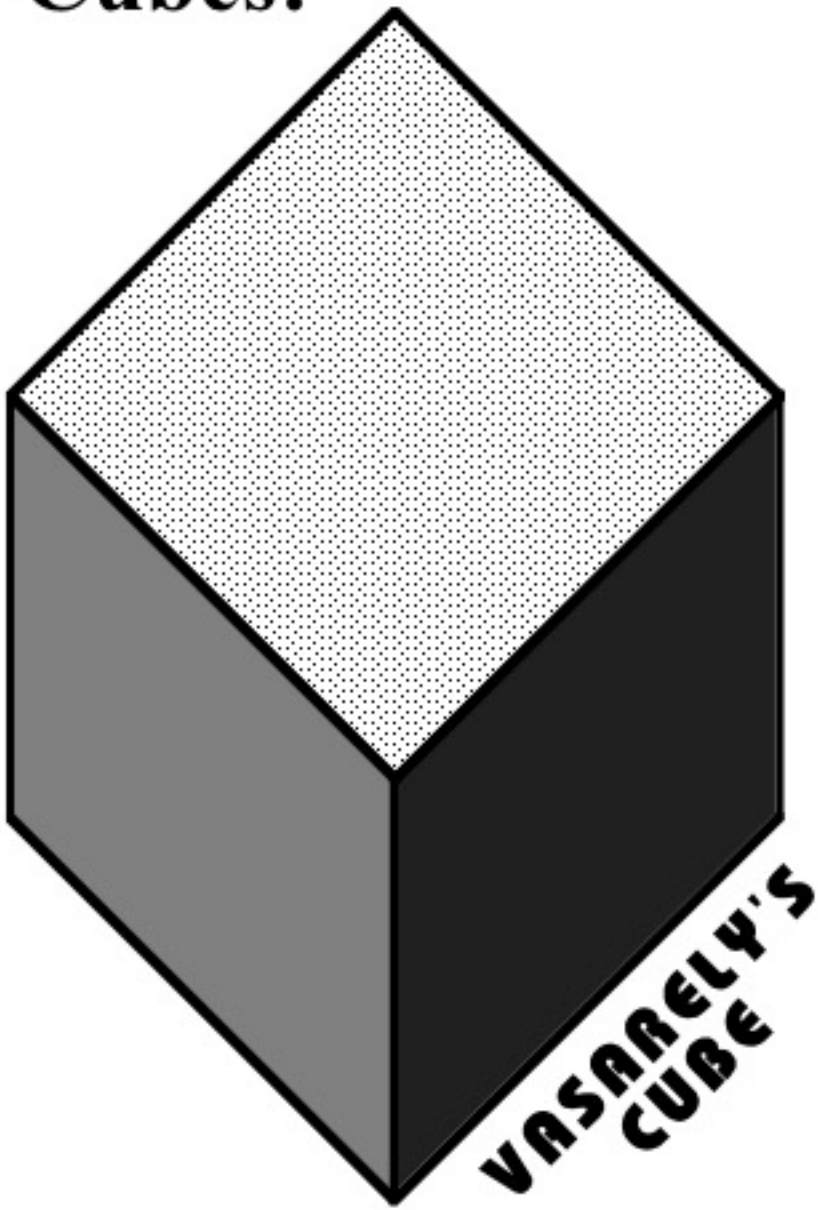






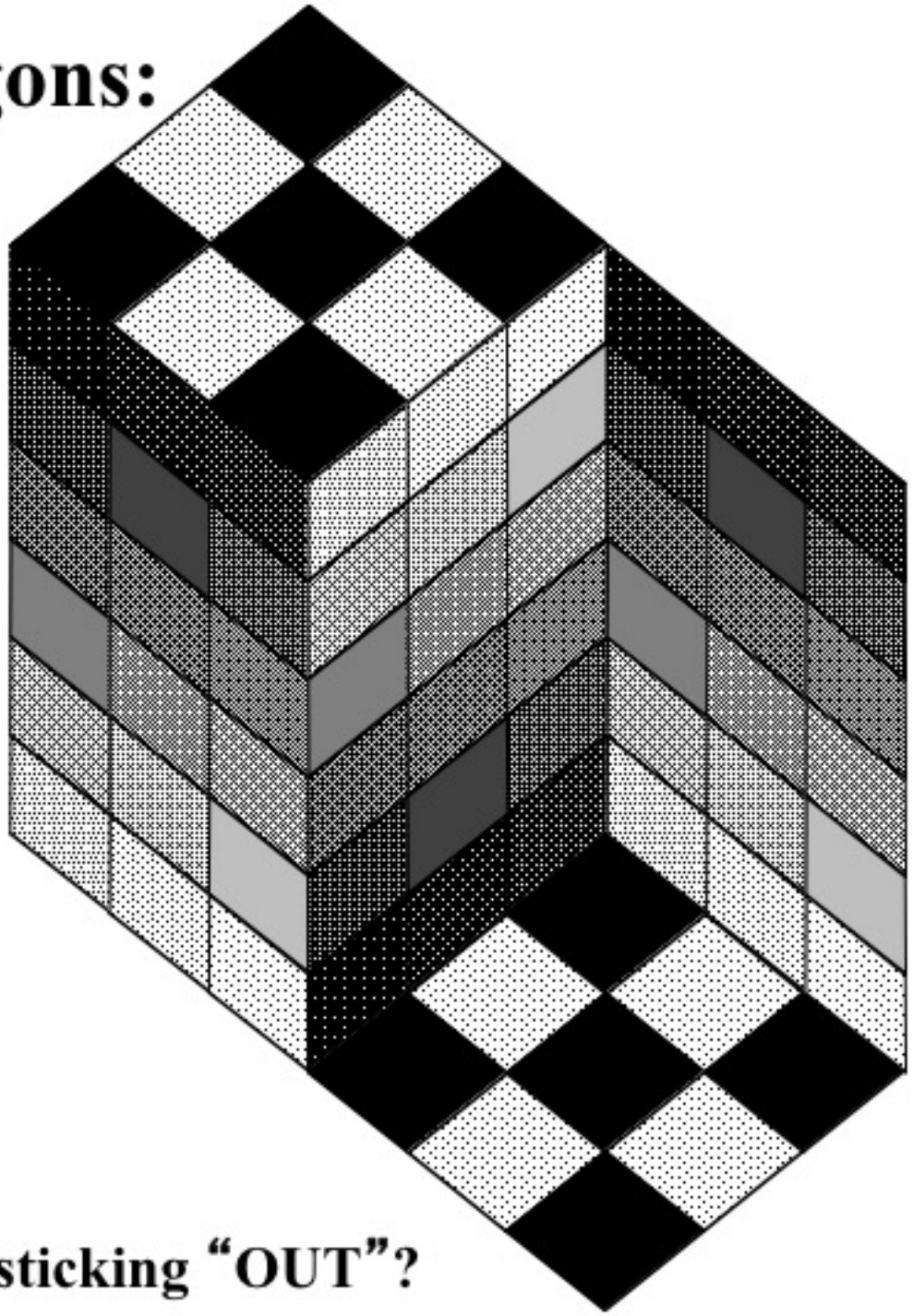
Two Kinds of "Optical" Cubes:



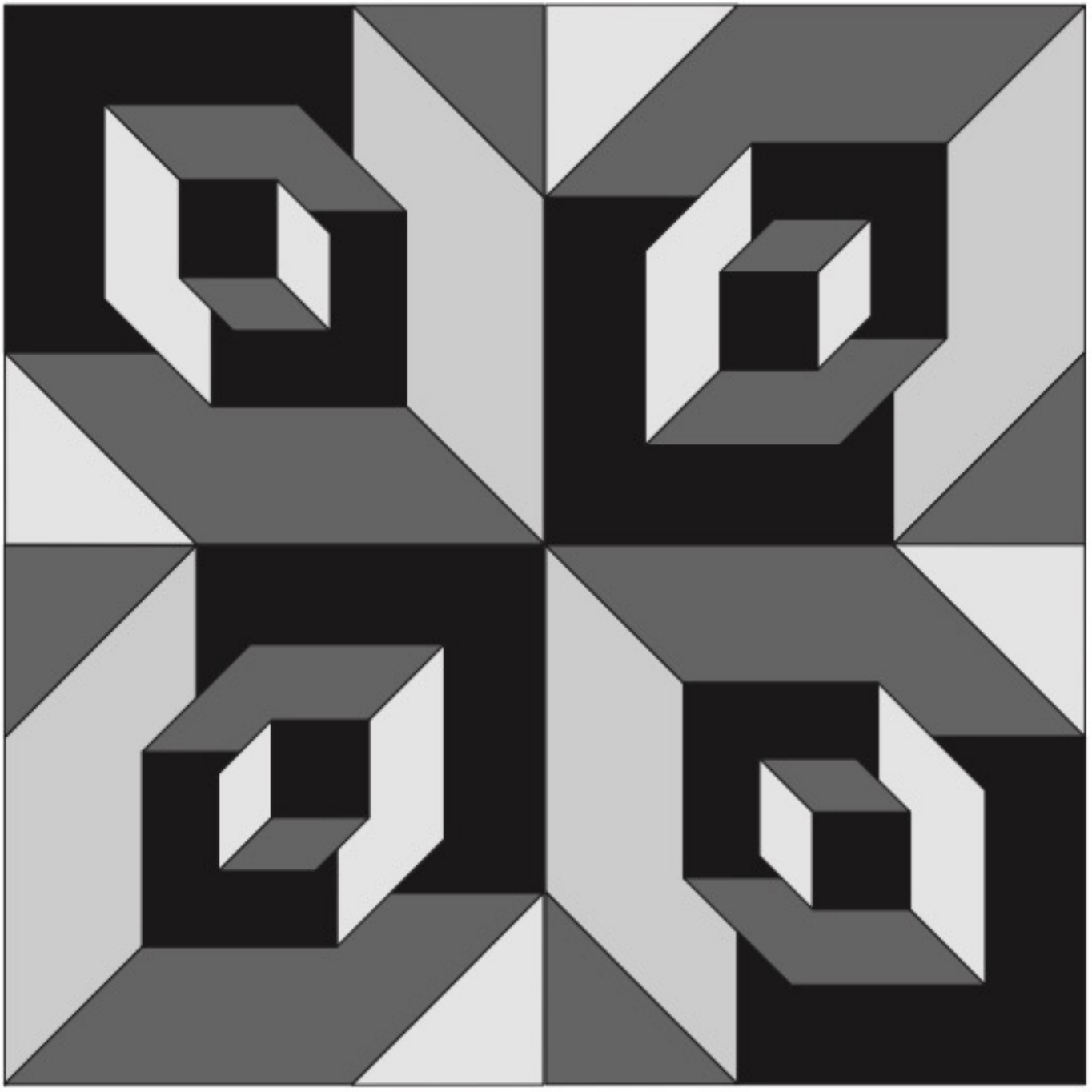


- Based on an equilateral rhombus
- Based on a square

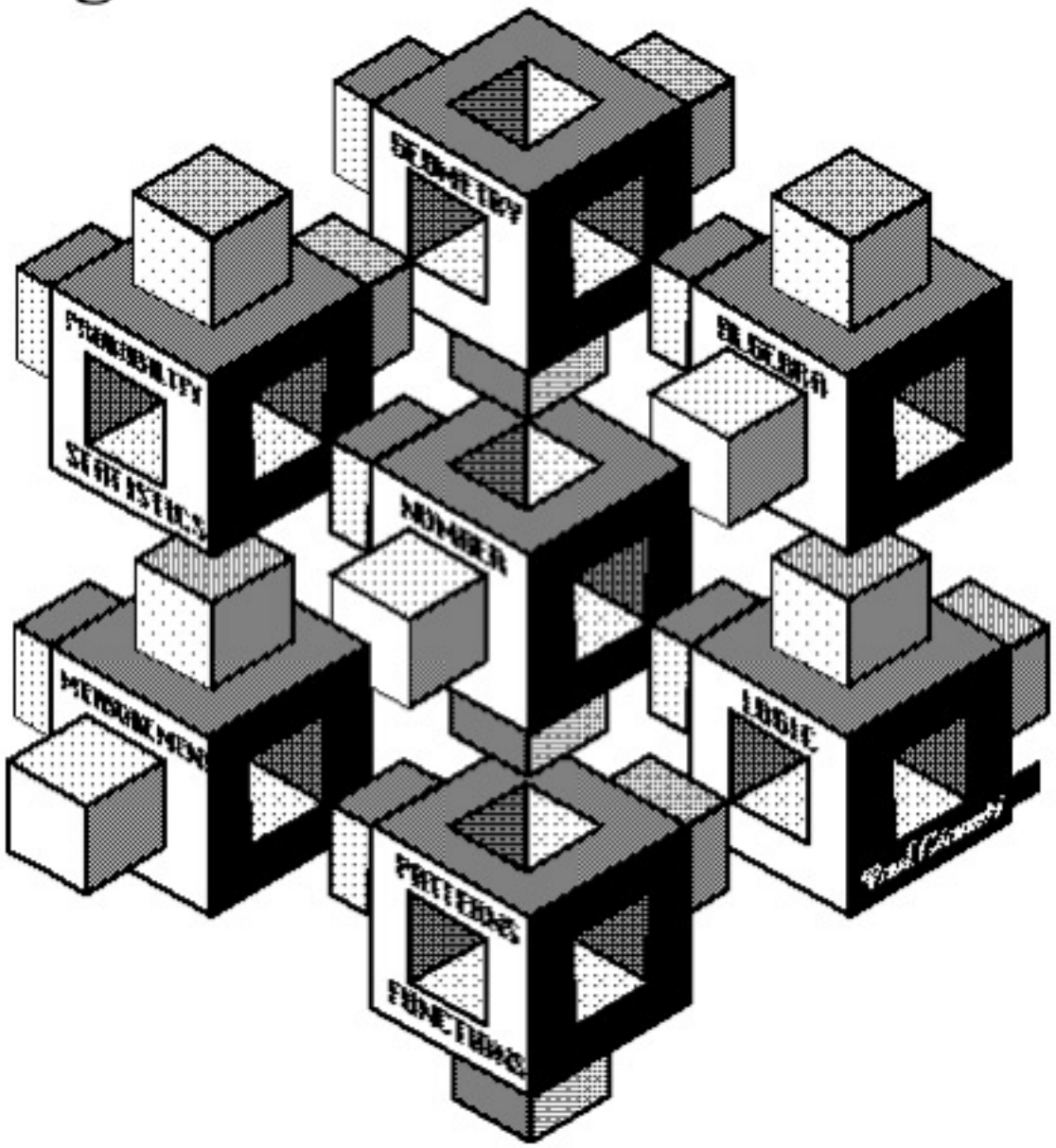
Vasarely's Hexagons:



Which side of the tower is sticking "OUT"?

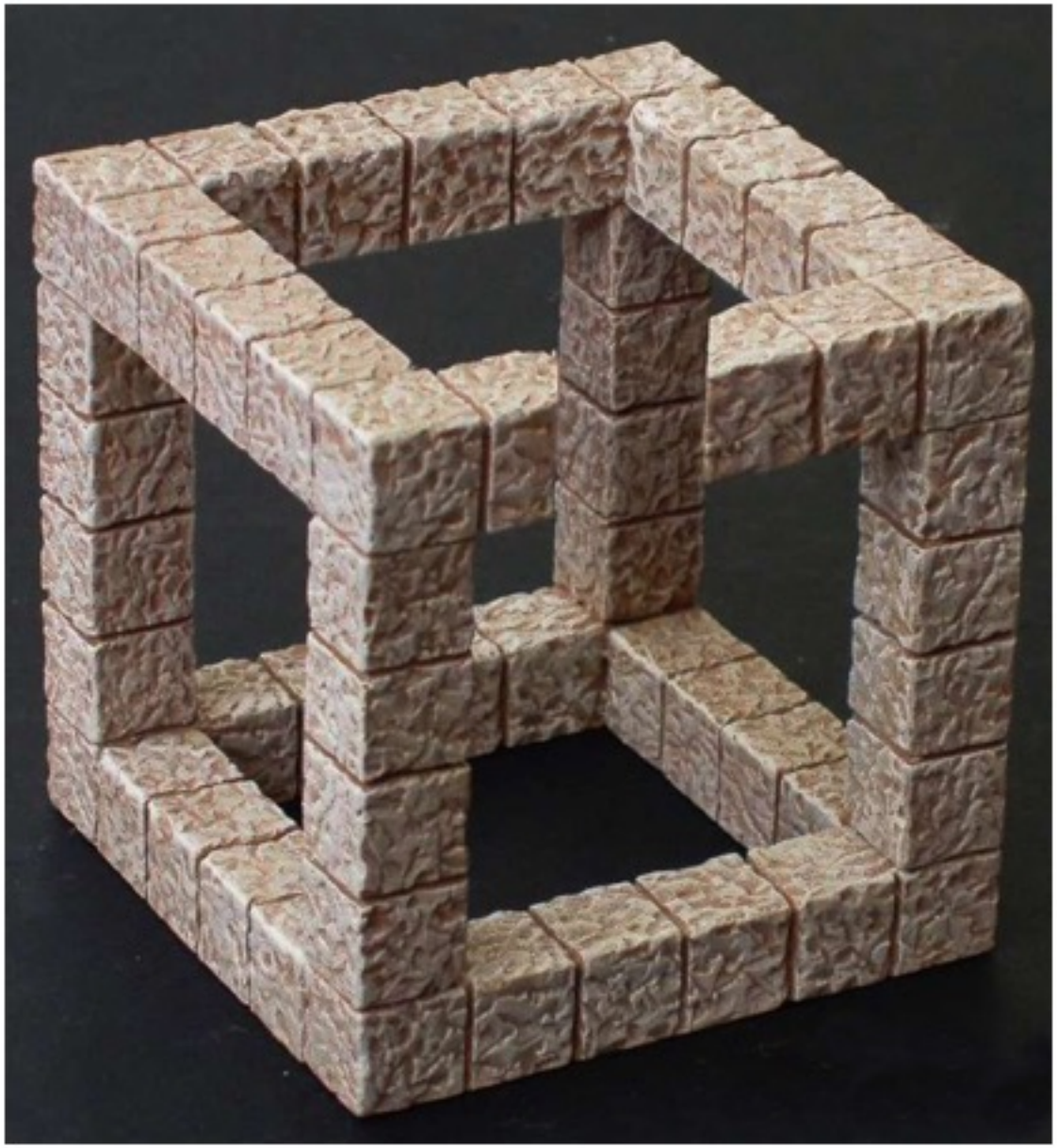


Interlocking Cubes:



Paul Giganti, Jr.

Impossible Cube:

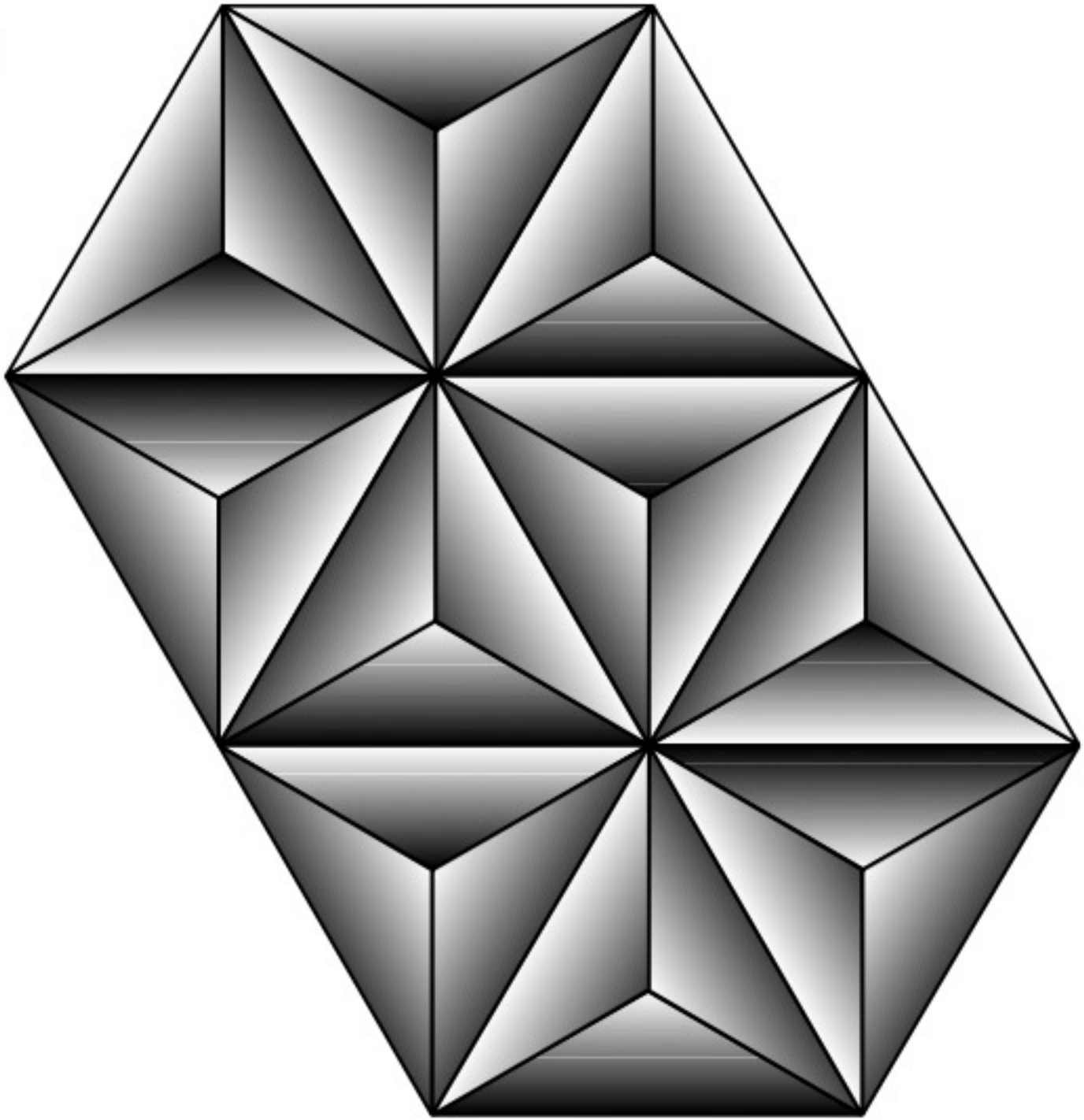


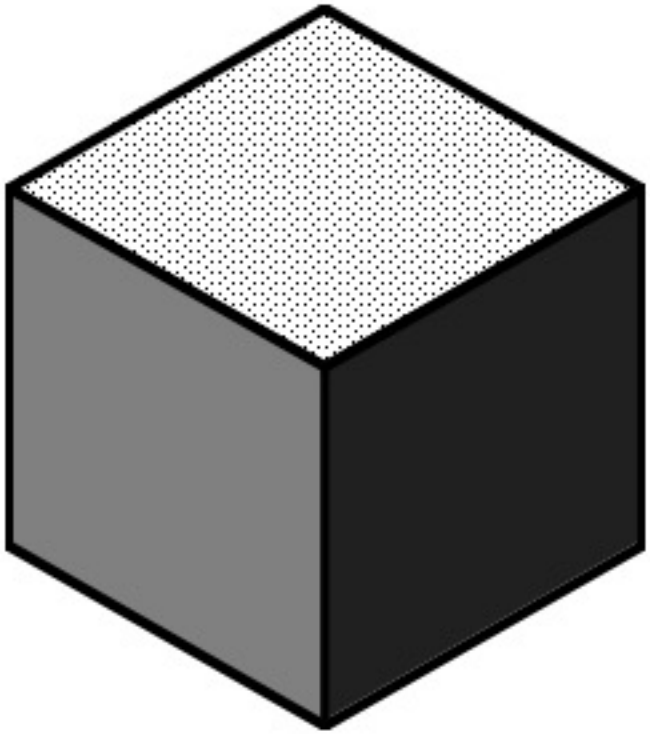
Paul Giganti, Jr.

Impossible Cube in Escher Art:

Paul Giganti, Jr.

Hexagon Stars:

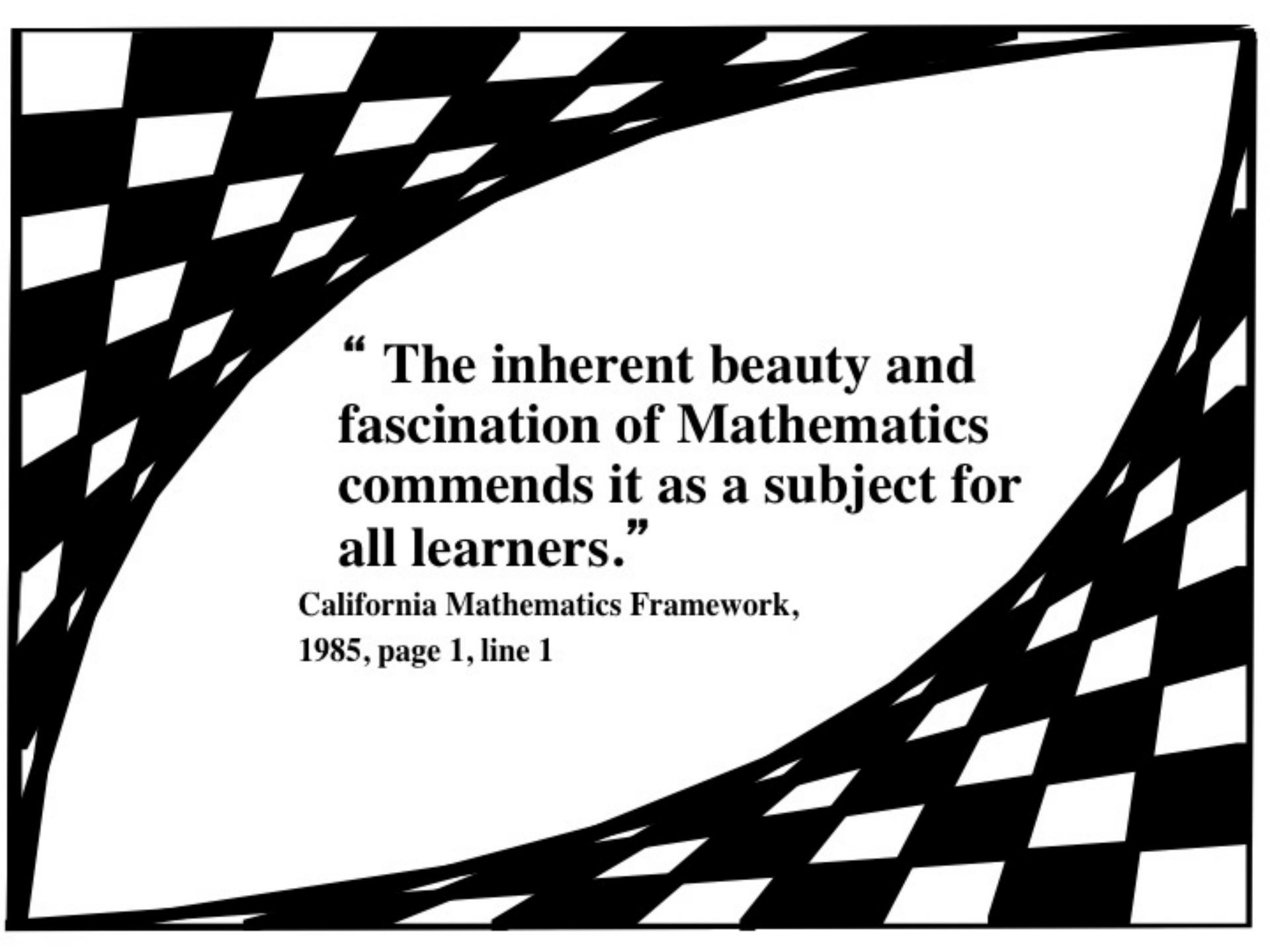


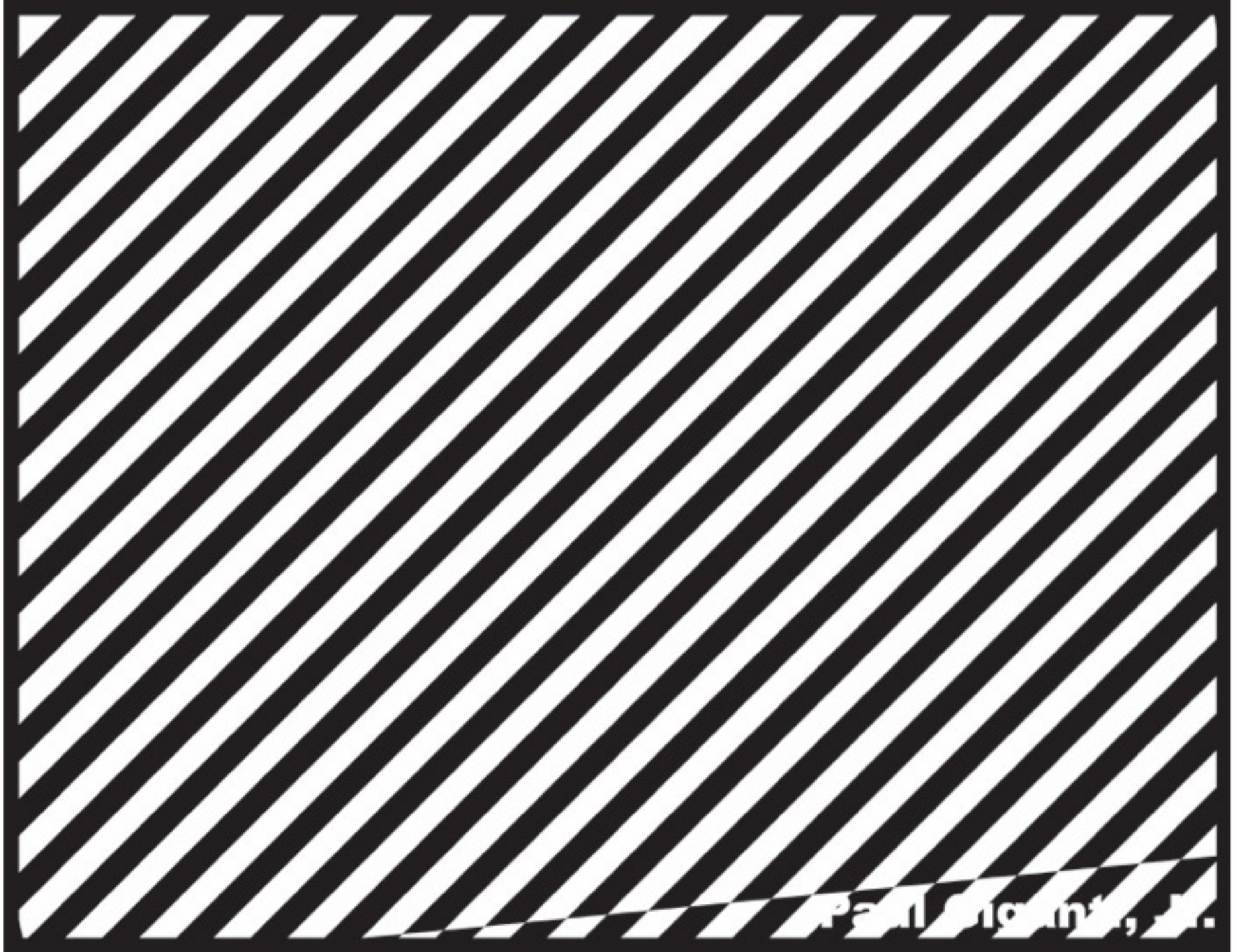


Directions…

- Start with a circle. Using a compass with the radius as its width, measure 6 arcs on the circle. Connect the 6 points to draw a hexagon in the circle.
- Carefully erase the circle and all marks leaving the hexagon.
- Draw a line from everyother point to the center point.
- Shade in the "faces" of the "cube with contrasting colors.
- Tile many of the same "cubes" to make a 3-D tessellation!

Paul Giganti, Jr.

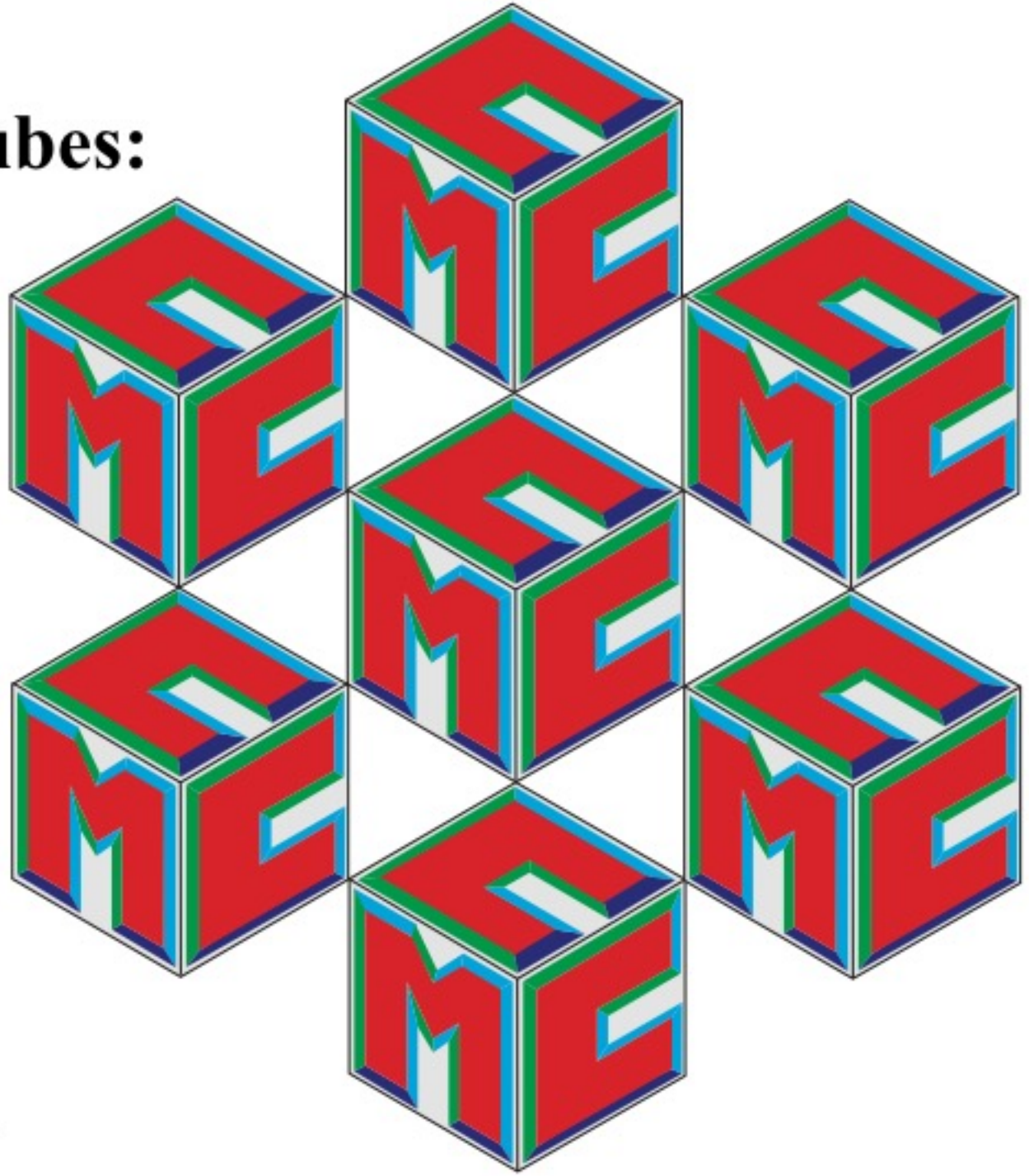

“ The inherent beauty and fascination of Mathematics commends it as a subject for all learners.”
California Mathematics Framework, 1985, page 1, line 1




thank
you

Any questions?

Rose of CMC Cubes:



The End

Paul Giganti, Jr.