

## Jumping Julia Mazes By Daniel Kline

The Julia Robinson Mathematics Festival ([jrmf.org](http://jrmf.org)) has been using Jumping Julia mazes for over a decade at our math festivals, events designed to share fun, meaningful math with K12 students. Our Jumping Julia mazes are based on Number Mazes, which were first published by Sam Loyd on April 24<sup>th</sup>, 1998 and popularized by Robert Abbott.<sup>1</sup> At our in-person festivals, Jumping Julia mazes are displayed on large floor mats that students can literally jump through to solve.



Students on a Jumping Julia maze mat at a 2019 math festival

A Jumping Julia maze is a grid of numbers, like the one below. To solve a Jumping Julia maze, you need to follow these rules:

1. Start on the top left square.
2. The number you are on tells you how many squares you must jump.
3. You can only jump in a straight line left, right, up, or down. You cannot move diagonally or in an L-shape.
4. Your goal is to reach the bottom right corner.

3 Start	2	3	2
2	1	2	1
2	2	2	2
1	3	1	★ Goal

<sup>1</sup> <http://cs.gettysburg.edu/~tneller/rjmaze/index.html>

Because COVID prevented us from hosting in-person festivals, we wanted to find another way to share Jumping Julia mazes. We created an online app for Jumping Julia mazes that is free for everyone and has 45 puzzles of different sizes and difficulty. You can find our Jumping Julia app here: [www.jrmf.org/activities/jumping-julia](http://www.jrmf.org/activities/jumping-julia).

Here's a sample of some of our favorite Jumping Julia mazes:

Puzzle 1

3 Start	2	2	1
3	2	1	3
1	1	1	1
1	3	1	★ Goal

Puzzle 2

2 Start	1	3	3
2	1	3	1
2	2	2	2
1	3	2	★ Goal

Puzzle 3

2 Start	3	4	3	1
3	1	4	2	4
3	1	2	1	3
3	1	3	2	3
4	2	1	2	★ Goal

Puzzle 4

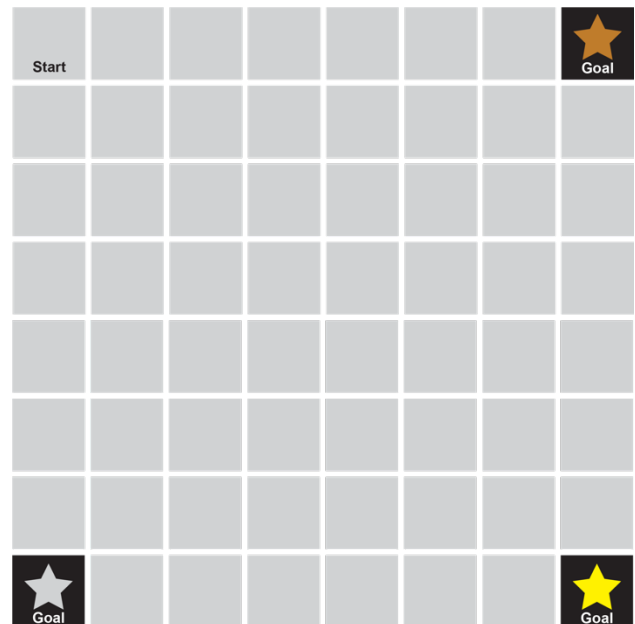
2 Start	5	4	4	3	3
4	1	3	4	1	3
5	2	1	5	1	4
3	4	2	1	1	4
4	5	5	1	2	1
2	2	2	5	4	★ Goal

As you explore our Jumping Julia mazes, here are some questions to think about:

1. Can you find more than one solution for each maze?
2. What is the fewest number of jumps you need to solve each puzzle?
3. Can you find a solution that visits every square?
4. Are there squares that aren't helpful for solving a puzzle? What makes them unhelpful<sup>2</sup>?
5. Can you find a strategy that helps you solve any Jumping Julia maze quickly and efficiently?

Recently, we've been able to host in-person festivals again, and we're currently trying to find the best way to turn our Jumping Julia mazes into a main attraction. Because of this, we wanted to design a much larger maze with multiple goals, and I wanted to leave the puzzle design challenge we've been working on here for you all to grapple with:

1. Make an 8 x 8 Jumping Julia maze with 3 goals in the non-start corners.
2. Make each goal a different difficulty (you get to decide what "difficulty" means).
3. Include at least one "loop" trap. You can see a loop trap made out of four 2's in the example puzzle on page 1.



***Want your own Jumping Julia maze mat? Purchase one through our website, or learn how to make your own for free! Learn more here: [www.jrmf.org/maze-mat](http://www.jrmf.org/maze-mat).***

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<sup>2</sup> Words like "helpful," "unhelpful," "quickly," and "efficiently" are left intentionally vague. Each of these terms may mean different things to different people, and we leave it up to you to decide which definition is most meaningful to you!