MaPP Challenge '19 - To Infinity And Beyond

Mathematical Puzzle Programs

Version 2018/08/28

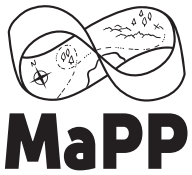

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Table of Contents

Part I

About

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Scoresheet

Game Control and your team each have a copy of this scoresheet. When submitting solutions, bring your team's copy to Game Control to be updated.

School Name	Team Name/ID	League

Opening Puzzle: Where No One Has Gone Before — Used to unlock Main Puzzles

Main Puzzles

1500VP for each Main Puzzle solved; Time Solved used to break ties in VP

1	Clontz - Hamiltonian Decompositions	Time Solved	VP Earned
2	Carrigan - Art gallery problems	Time Solved	VP Earned
3	Couch - Matroids(?)	Time Solved	VP Earned
4	Clontz/Varagona - Idempotent Relations	Time Solved	VP Earned

Cryptic Puzzles

500VP for each Cryptic Puzzle solved; Time Solved used to break ties in VP

1	Clontz - Constellations	Time Solved	VP Earned
2	Clair - Space Travel	Time Solved	VP Earned
3	Clontz/Reiter - KenKenKen	Time Solved	VP Earned
4	Clontz/Harshbarger - Word Problem	Time Solved	VP Earned

Bonus Puzzle

Up to 500VP for best submission

Holshouser - Origami	First Submission	Second Submission	Third Submission	VP Earned

Metapuzzle

1000VP if solved, Time Solved used to break ties in VP

???	Time Solved	VP Earned

Up to 500VP if earned, Time Acquired used to break ties in VP

Additional VP	Time Acquired	VP Earned

10,000VP Maximum

Total VP Earned

Part II

Puzzles

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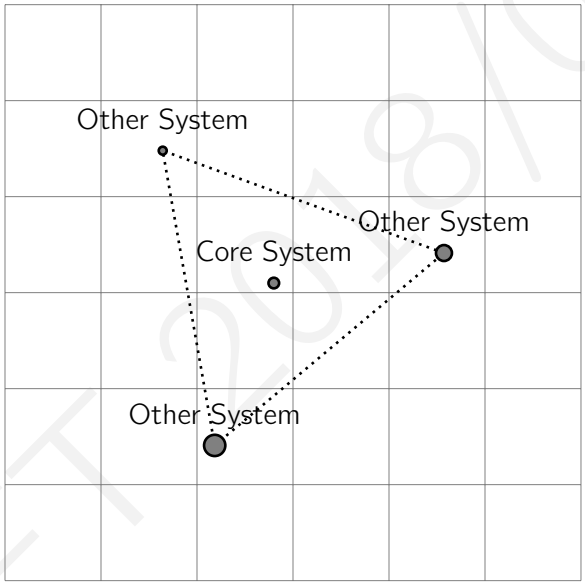
Where No One Has Gone Before

Opening Puzzle

Today's adventure begins as your team's ship launches into space. Space Fleet has provided you a **Galaxy Map** to guide you on your way. (Actually, several copies have been provided to you! Take care of these copies, as you will refer to the Galaxy Map several times throughout the adventure.) Each dot on the map refers to a different solar system, named on the map.

Space Fleet commands you to first visit the four **Core Systems** of the galaxy. You can recognize a Core System by the fact that it is located in the middle of a regular polygon (all sides are the same length) formed by either three, four, five, or seven other systems. An example is shown below.



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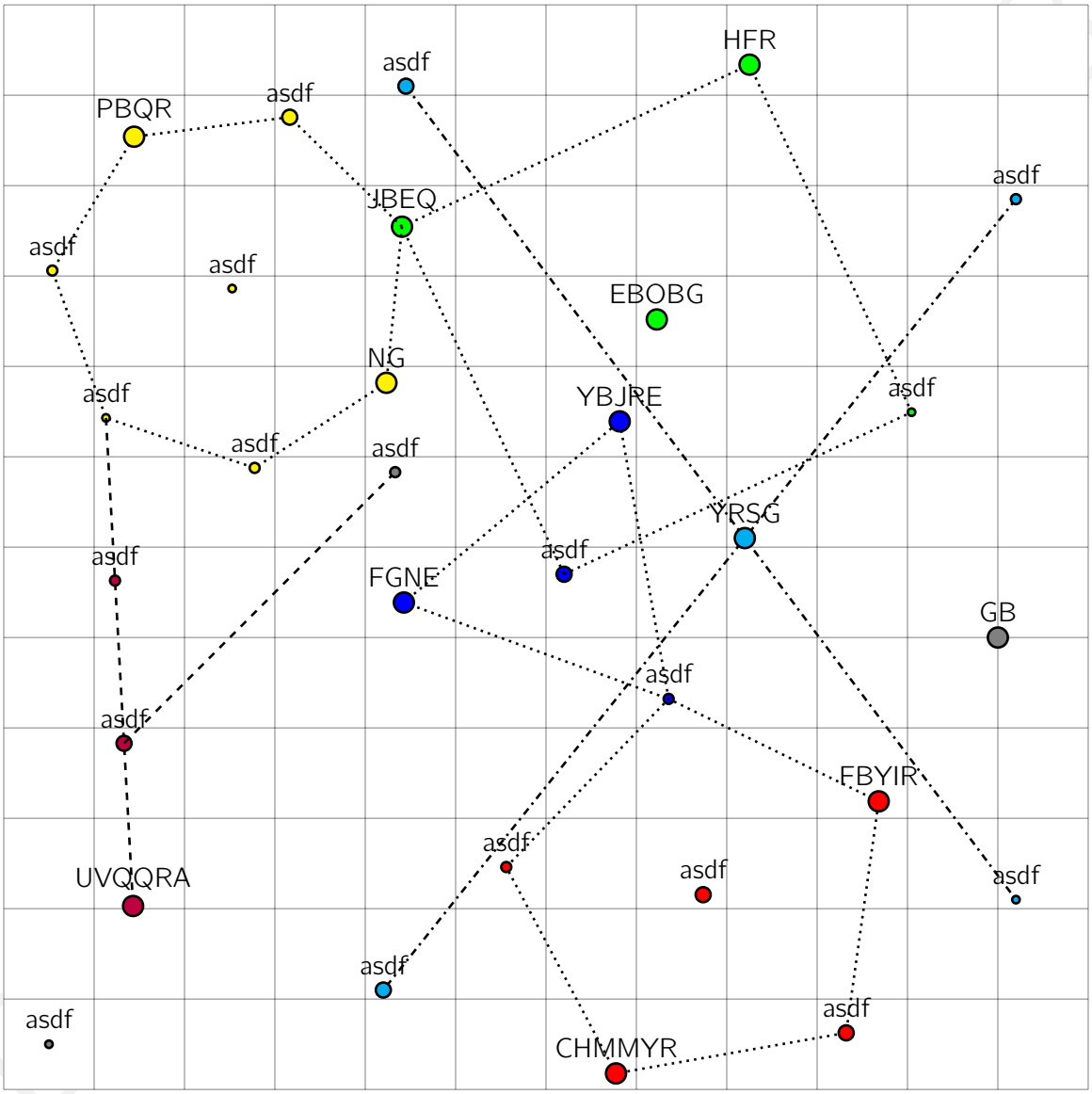
Where No One Has Gone Before

Galaxy Chart



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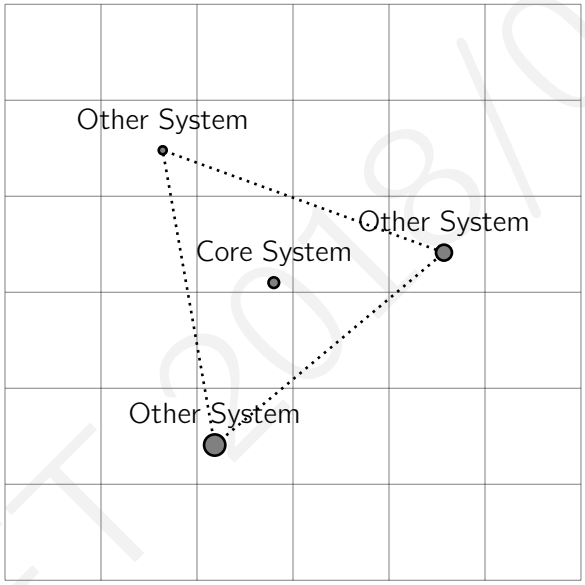
Good News Everyone

Main Puzzle 1

Today's adventure begins as your team's ship launches into space. Space Fleet has provided you a **Galaxy Map** to guide you on your way. (Actually, several copies have been provided to you! Take care of these copies, as you will refer to the Galaxy Map several times throughout the adventure.) Each dot on the map refers to a different solar system, named on the map.

Space Fleet commands you to first visit the four **Core Systems** of the galaxy. You can recognize a Core System by the fact that it is located in the middle of a regular polygon (all sides are the same length) formed by either three, four, five, or seven other systems. An example is shown below.



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Good News Everyone

Delivery Schedule

Home

Monday	B	C	D	E	F	G	Monday
Wednesday							Wednesday
Friday							Friday

Home

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Jumping Through Hyperspace

Main Puzzle 4

On this system, your adventure takes you to a racous space saloon, swapping tales with Jan Duo, an infamous smuggler with a heart of gold.

He explains to you that in the early days of hyperspace travel, engines could instantly transport ships between only certain locations on a six-lightyear continuum. These options were illustrated using a graph, where the horizontal coordinate represents starting positions, and the vertical coordinate represents ending positions.

In Example A illustrated below, a ship at position 0 could be teleported to any position between 0 and 6, a ship at position 0.5 could only be teleported to positions 4.5 or 6, and a ship at any position between 2 and 6 could only be teleported to position 6.

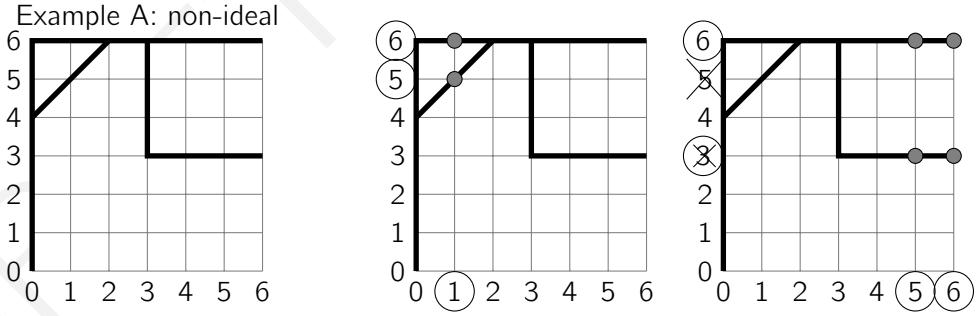
The goal of a hyperspace engine is to be **ideal**: the collection of possible destinations from each point using exactly one teleportation should be exactly the same as the collection of possible destinations using exactly two teleportations.

This means Example A is not ideal. Position 1 teleports to positions 5 and 6, but from positions 5 and 6, there are two problems: a new destination 3 can be reached, and the destiation 5 can no longer be reached.

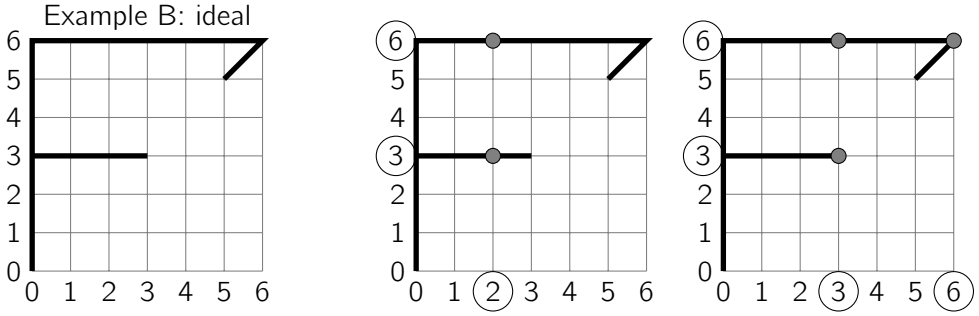
However, Example B is ideal. From 0, any position can be reached after either one or two teleportations. From 2, positions 3 and 6 can be reached after either one or two teleportations. From 4, position 6 can be reached after one or two teleportations. From 5, positions 5 and 6 can be reached after one or two teleportations. And so on.

Jan suggests that you review your **Hyperspace Engines** document; perhaps the illustrations representing ideal engines will reveal a hidden message?

Example A: non-ideal



Example B: ideal



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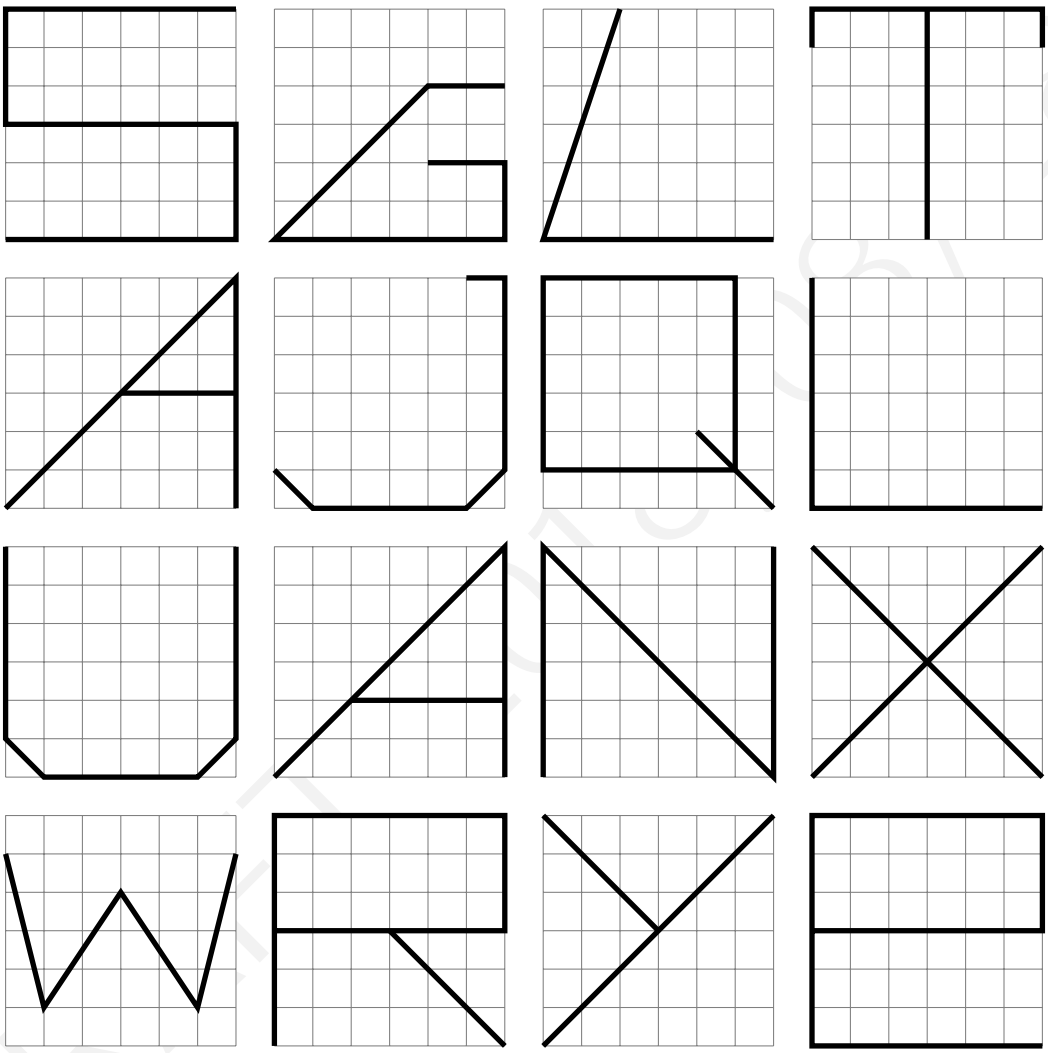
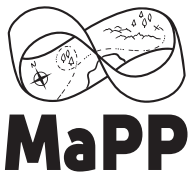
Jumping Through Hyperspace

Hyperspace Engines





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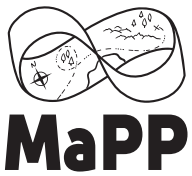
Word Problem

Cryptic Puzzle 4



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Word Problem

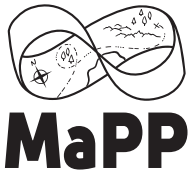
Mysterious Message

For a time I tried carefully to detail yarns via large crawling textboxes.

However, composing all of the concepts when curbed by finite room, the new strategy now is...

Part III

Solutions



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Solutions

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