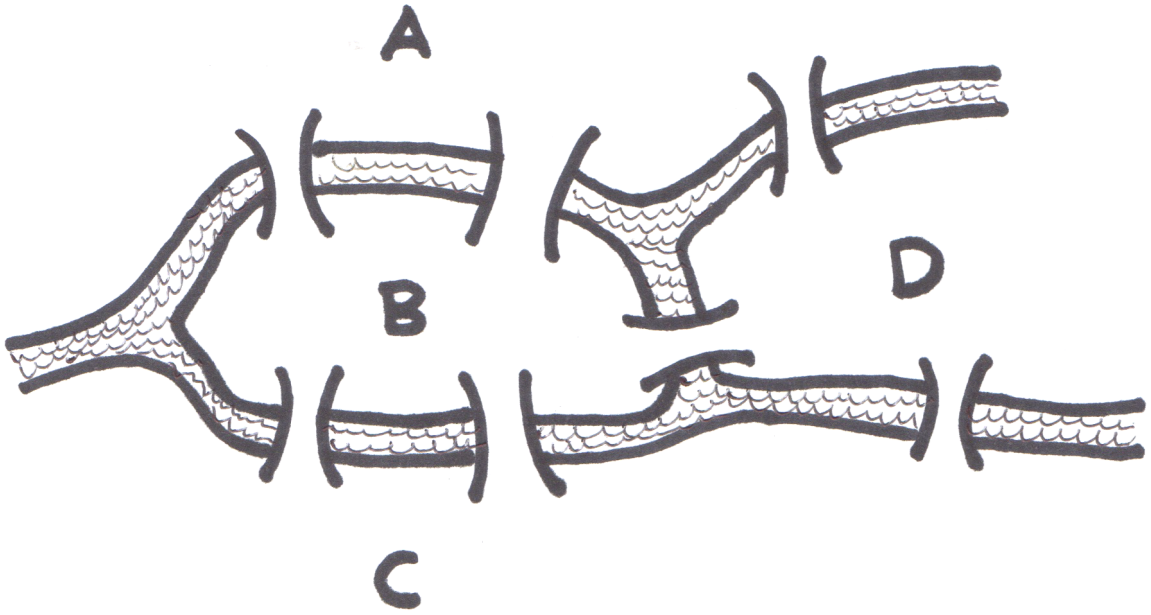
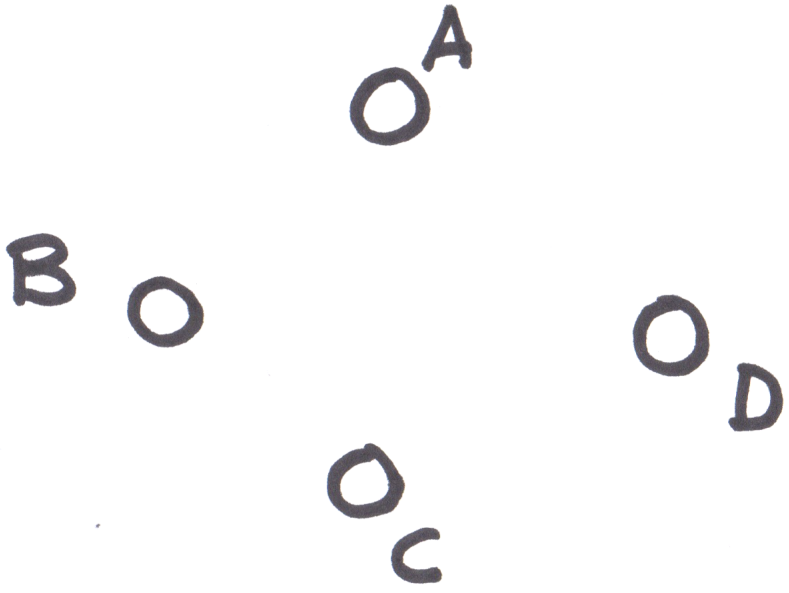
# The Königsberg bridges

The old town of Königsberg has seven bridges. The famous mathematician Euler asked himself: "can you take a walk through the town, visiting each part of the town (A, B, C and D), and crossing each bridge only once?



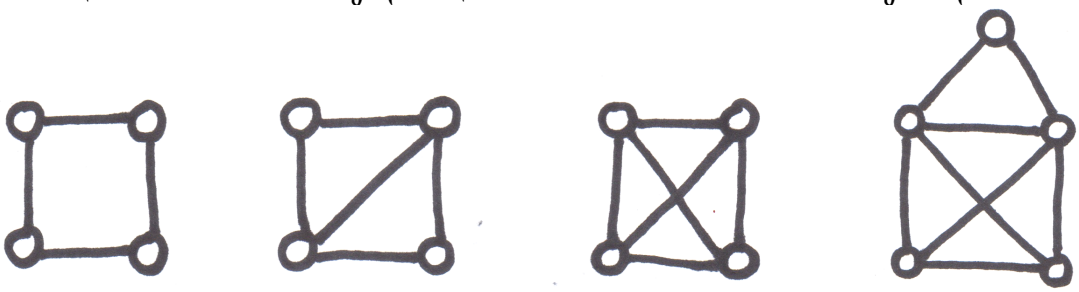

## Let's simplify the problem

Each dot is a zone in the city. Connect the zones/dots using lines as the bridges
Now Euler's question is: can you draw each line only once without lifting your pencil?



## Paths on shapes

Draw these shapes without lifting your pencil and without retracing any line

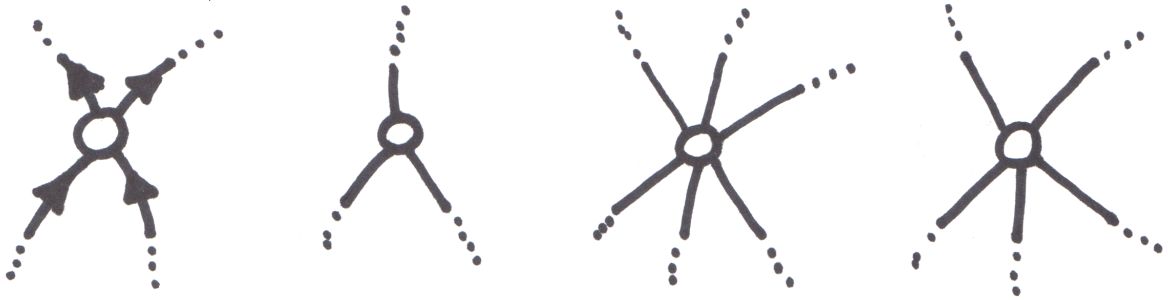


A B C D

| Shape | A | B | C | D |
|---|---|---|---|---|
| Success? | | | | |

## Arriving and leaving the dots.

While drawing the shapes, how many times can you arrive and leave the dot using each line only once?



A B C D

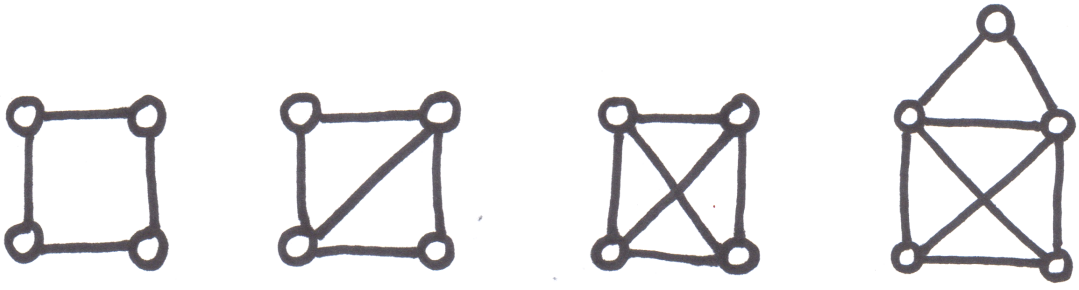
| Shape | A | B | C | D |
|---|---|---|---|---|
| Number of lines | 4 | 3 | | |
| How many times you crossed the dot? | 2 | | | |
| Any line left? | No! | | | |

Do you see a pattern? Which ones can be only at the beginning or the end of our path?

Pattern:

- Odd number of lines: those dots can only be the beginning or the end of our path.
- Even number of lines: those dots can only be in the middle of our path.

So, let's try again




| Shape | A | B | C | D |
|---|---|---|---|---|
| Number of dots with even number of lines | 4 | | | |
| Number of dots with odd number of lines | 0 | | | |
| Success? | Yes! | | | |

What about the Krönisgberg problem? How many dots with even number of lines? Odd number? Can Euler walk the bridges as he proposed?