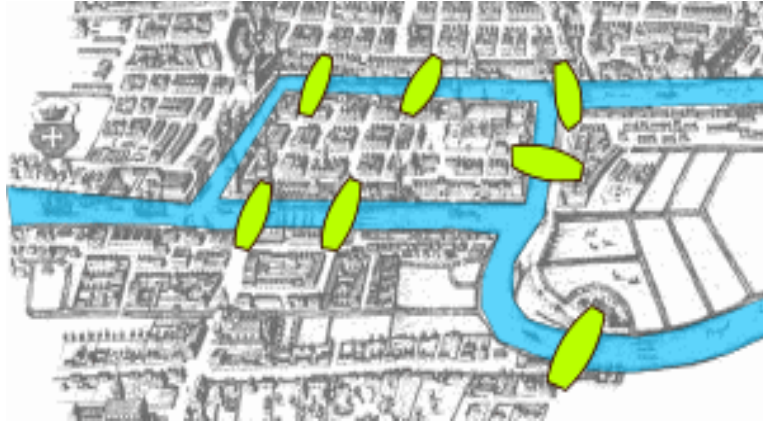


The Seven Bridges of Königsberg



Is it possible to map a route through the city which crosses each bridge once and only once?

Residents of this Russian city frequently claimed they had found a way of crossing all the bridges only once (often after a night out), but when asked to retrace their steps nobody was ever able to conclusively prove it to be possible.

This problem, which made walks through this city frustrating for Russian mathematicians for years, was eventually solved by Leonhard Euler (pronounced *Oiler*) in 1735.

1. Can you find a solution?

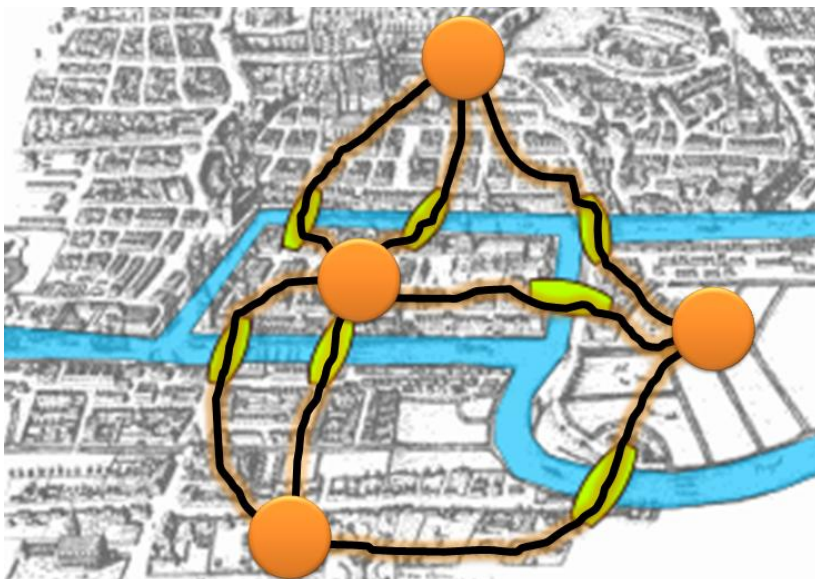
[note: it is not permitted to half-cross a bridge, then cross the other half later, and it is not possible to cross the rivers in any way other than via one of these bridges.]

2. Stuck?

Now allow yourself to demolish one single bridge. Is it possible now?
Try building a bridge somewhere – does this make it possible?

3. Food for thought...

Euler solved the problem by noticing that the path you take between bridges makes no difference, and that the **number of route choices between land-masses** was the most important thing. Use this diagram to help you decide how he solved the problem:



Hint:

Think about your start and finish points.
How many routes could they have?

What about non-start/finish points?
How many routes could they have?