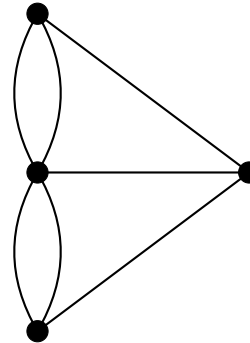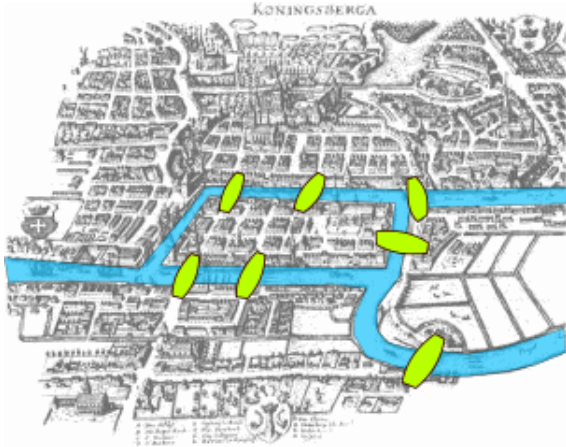# Graph Theory- An Overview

A **graph** is a mathematical object that is often used to represent some real-world situation. A famous example involves the German city of Königsberg. To the left is a map of the city. To the right is a graph- the dots represent land masses and the lines represent bridges.



The subject of graph theory highlights the power of mathematical abstraction. One can study graphs 'abstractly', by just considering them as collections of dots and lines without context. Then one can apply the results of this study to conclude facts about real-world examples. It is common that a single theorem in graph theory implies multiple different facts in different fields.

Some important questions about graphs:

**1.1.** What is some of the important mathematical vocabulary associated with graphs?

**1.2.** What theorem is associated with the graph of Königsberg, drawn above?

**2.1.** What are some examples of real-world situations which can be represented using graphs?

**2.2.** What is a directed graph? What can it be used to represent?