A brief introduction to drawing figures for LaTeX

There are a number of ways to include diagrams in LaTeX — in this document I will share some of my preferred solutions.

MetaPost

My favourite solution is to use MetaPost to draw figures for inclusion in LaTeX documents. MetaPost is part of the MiKTeX distribution of LaTeX and can be used to produce Encapsulated PostScript files for inclusion in your own LaTeX documents. [Beware: it can be tricky to use both .eps and other picture formats (such as .jpeg) in a LaTeX document.]

MetaPost is not a drag-and-drop drawing program, so like LaTeX you must first write the code and then compile it to get the required image file. Some sample code (`graphfig.mp`) is provided on the ELE page for ECM1704.

TeXmaker can handle .mp files as follows:

1. download `graphfig.mp` from the ELE page for this module;
2. open it in TeXmaker;
3. compile the code by choosing `MPost` from the `Tools` menu.

In theory, the .mp file will compile and produce three image files called `graphfig.1`, `graphfig.2` and `graphfig.3`. These are Encapsulated PostScript files and can be included in a LaTeX document in the following way:

1. add the line `\usepackage{graphicx}` after the `\documentclass` command but before `\begin{document}` in your .tex file.
2. add the line `\includegraphics{graphfig.1}` where you wish the image to appear;
3. compile the .tex file to .dvi (latex), then to .ps (dvips) and finally to .pdf (ps2pdf).

You can be much more subtle with the way in which your images appear in your document, for example:

- `\includegraphics` can take many optional parameters such as the width of the image;
- you may wish to embed your image in a `figure` environment, as I have done in this document to get more control over where it appears and allowing you to add captions and references to the figure in the text;
- if you do use the `figure` environment then you will also want to include the `float` package so that the figure appears where you want it and not where LaTeX wants it!

In this file I have included the images from graphfig.mp as Figures 1, 2 and 3.

You should spend some time experimenting with these features — there is plenty of information online about them. In particular, MetaPost comes with a useful and comprehensible manual (`mpman.pdf`) that takes the reader from very basic to advanced material.

Alternatives to MetaPost

There are many alternatives to MetaPost and I discuss two possibilities below. These are both perhaps better from a typesetting viewpoint as you can guarantee that any text in your diagram is typeset in an identical way to the text in the rest of your document, but I don't feel that they are as powerful at drawing.

- `pstricks` — this is a LaTeX package that allows you to code images directly into your LaTeX document. You still need to compile to .dvi, then .ps, then .pdf.
- `tikz` is a package that allows you to code images directly into your LaTeX document, but works with pdflatex, so you can compile straight to .pdf. The syntax is modelled on MetaPost and it has lots of useful libraries and a good manual. If I want to draw a simple figure with minimum fuss then I use TikZ.

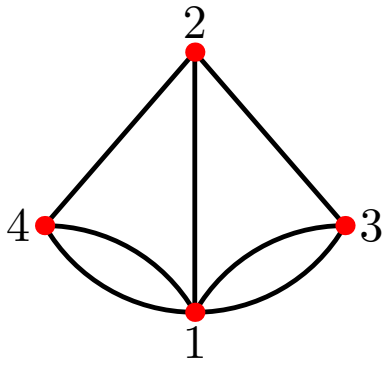

Figure 1: The graph for the Königsberg bridge problem with vertex labels.

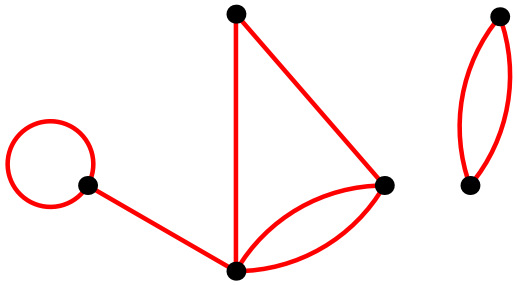

Figure 2: A disconnected graph with red edges.

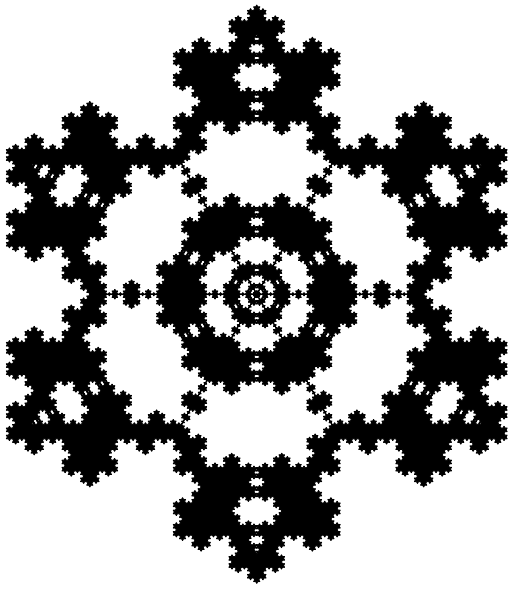

Figure 3: A snowflake drawn by cutting out an anti-Koch snowflake from a Koch snowflake.