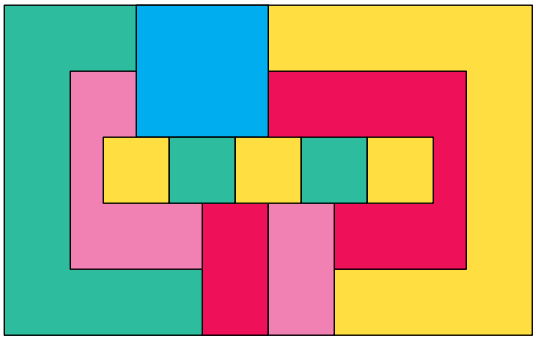
Colouring

Question 1

The diagram shows a "map" with twelve regions. Each region is coloured in one of five colours so that regions of the same colour do not meet.

Show how to colour the map with just four colours so that regions of the same colour do not meet.

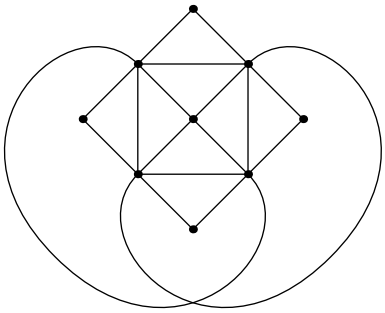


Question 2

The diagram shows a graph G with nine nodes and eighteen edges; two of the edges are shown as curves.

(a) What is the smallest number of colours needed in a *vertex colouring* of G?

(b) Prove that your answer is the smallest.



Question 3

The diagram shows a graph H with sixteen nodes and twenty-four edges.

(a) What is the smallest number of colours needed in an *edge colouring* of H?

(b) Prove that your answer is the smallest.