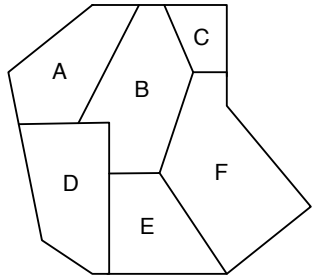
2. (a) Explain how the following heuristics operate in a backtracking search.

- minimum remaining values,
- degree heuristic, and
- least constraining value. [6]

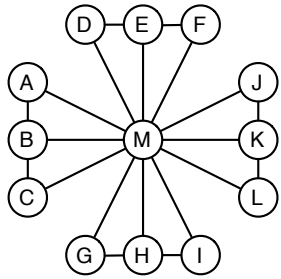
(b) Suppose that you are given a CSP represented by the map shown below, containing variables $\{A, B, C, D, E, F\}$ corresponding to regions in the map, such that regions should be coloured from the set $\{red, green, blue\}$ with the constraint that adjacent regions must not be the same colour.



i. Give the constraint graph for this problem. [3]

ii. Use the backtracking algorithm with forward checking to solve this CSP, using appropriate heuristics. Show all the steps carried out and justify the choices made with regard to attribute selection and value assignment at each stage. [6]

(c) With reference to the following constraint graph, explain how cutset conditioning can be used to make the search more efficient, and state numerically the upper bound on the number of nodes expanded with and without cutset conditioning. Assume each variable is to be assigned a value from the set $\{low, medium, high\}$. [6]



(d) Describe how properties of an environment, such as its observability, impact on the design for an intelligent agent. [4]