

TUTORIAL - SERIES NO. 05

Exercise 01 (Timetable problem)

A university has to organize exam schedules. Suppose there are 7 exams to be scheduled, corresponding to courses numbered from 1 to 7, and that the following pairs of courses have students in common: 1 and 2, 1 and 3, 1 and 4, 1 and 7, 2 and 3, 2 and 4, 2 and 5, 2 and 7, 3 and 4, 3 and 6, 3 and 7, 4 and 5, 4 and 6, 5 and 6, 5 and 7, and 6 and 7. How can these exams be organized so that no student has to take two exams at the same time and over a minimum period of time?

Exercise 02 (An aquarium problem)

A, B, C, D, E, F, G and H denote eight fish; in the table below, a cross means that the fish cannot coexist in the same aquarium:

	A	B	C	D	E	F	G	H
A		X	X	X			X	
B	X				X	X	X	
C	X			X		X	X	X
D	X		X		X			X
E		X		X		X	X	
F		X	X		X			
G	X	X	X		X			
H	X		X	X				

What is the minimum number of aquariums required?

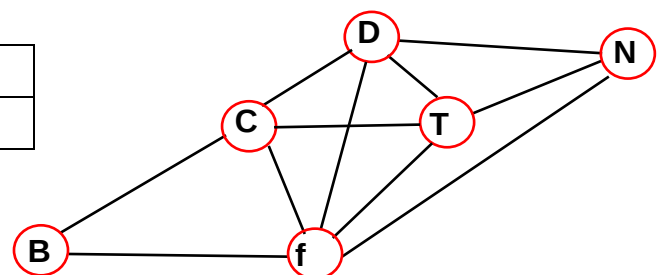
Exercise 03 (Coloring problem)

A group of friends organize a walk in the mountains. The graph below represents the vertices B, C, D, F, T, N through which they can choose to pass..

An edge between two vertices signifies the existence of a path between the two vertices.

1. Complete the table below:

Vertices	B	C	D	F	N	T
Degrees of the vertices						



Graph G

2. Is graph G connected?

The group wants to visit the six peaks, passing each path once and only once.

3. Demonstrate that this is possible and give an example of a route to be taken by the group.
4. The group wants to associate each vertex with a color so that vertices connected by a path do not have the same color. We denote by n the chromatic number of the graph.
 - a) Show that $4 \leq n \leq 6$
 - b) Suggest a coloring of the graph to determine its chromatic number.

Good luck