

Homework 2

Networks and Graphs

Deadline: April 20, 18:00

Please submit your answers using Canvas
Attach a single pdf file with your names, VUnet IDs and home-work group names and of course answers!

1 Harary Graphs (20%)

- a) Is Harary graph $H_{5,7}$ a planar graph?
- b) Is Harary graph $H_{4,6}$ a planar graph?

In both cases, justify your answer.

Note: Drawing a graph is only sufficient, in case a graph is planar.

2 Bipartite Graph (25%)

Prove that any tree with at least two vertices is bipartite.

3 Vertex Cut (25%)

Let v be a vertex of a simple, connected graph G .

- a) Prove that v has a neighbor in every component of $G - v$.
- b) Can a cut-vertex have degree 1? Justify your answer.

4 Induction (30%)

Use **induction** to prove that a connected graph G without cycles has $n - 1$ edges, where $n > 0$ is the number of nodes of G .

Note: The point is to use *induction* to show it. Another type of solution, even if correct, will not count.