Distributed Algorithms 2021

Graph-theoretic foundations
Graphs in this course

• Defining:
  • models of distributed computing
  • what we want to solve
  • what are the assumptions

• Designing & analyzing algorithms

• Proving impossibility results

• Often: $\text{graph} \approx \text{network, node} \approx \text{computer}$
Quiz

• Graph where maximal independent sets are never minimum dominating sets?
Please do not confuse

- **Maximal**
  - not a subset of another solution
  - very easy to find: add greedily

- **Maximum**
  - largest possible solution
  - often hard to find
Please do not confuse

- **Minimal**
  - not a superset of another solution
  - very easy to find: remove greedily

- **Minimum**
  - smallest possible solution
  - often hard to find
Please answer on Zulip...
Minimum vertex cover
Minimum dominating set
Maximum independent set
Smallest set of nodes that is both an independent set and a dominating set
Largest set of nodes that is both an independent set and a dominating set
Maximum matching
Minimum edge cover
Minimum edge dominating set
Smallest set of edges that is both a matching and an edge dominating set
Largest set of edges that is both a matching and an edge dominating set
Minimum edge dominating set that is not a matching
Largest set of nodes that induces a bipartite subgraph
Largest set of edges that induces a subgraph with 2 connected components
Largest set of nodes that induces a subgraph of maximum degree 2
Largest set of edges that induces a subgraph of maximum degree 2
Set of nodes that induces a 2-regular subgraph
Nodes $u$ and $v$ such that the distance from $u$ to $v$ equals the diameter of the graph.