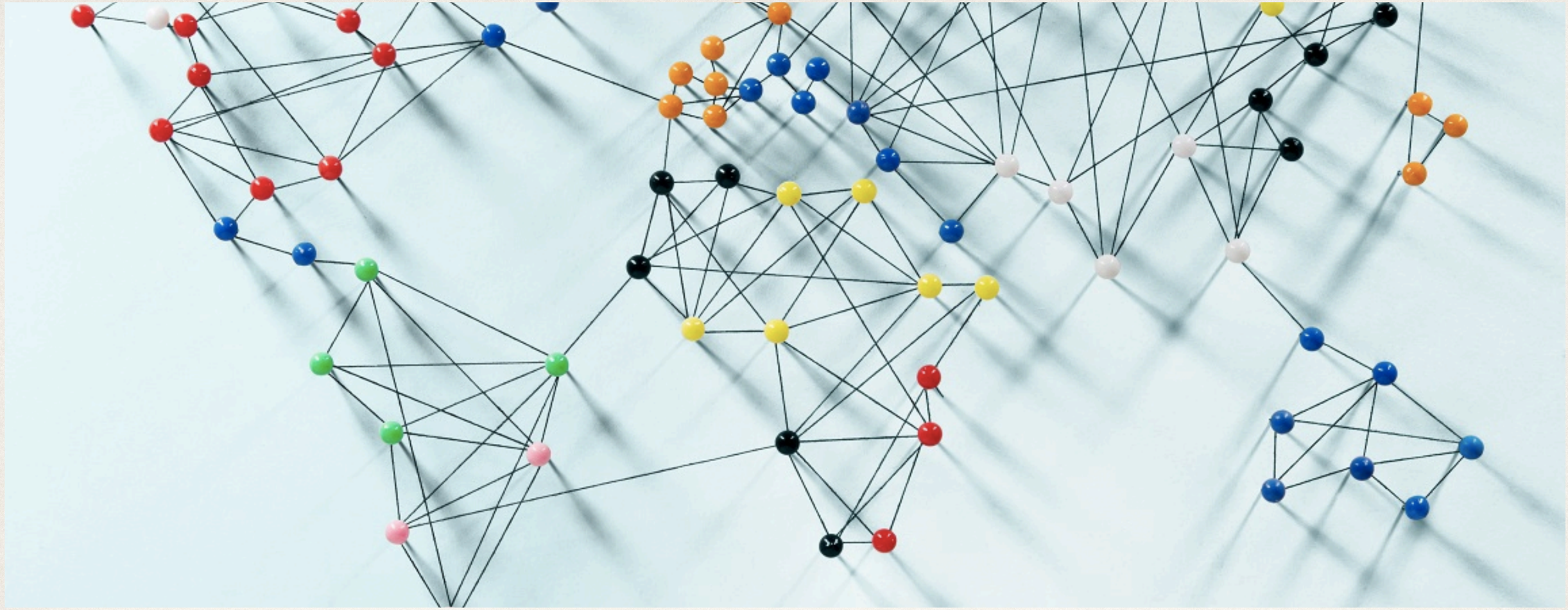


GRAPH PROBLEMS

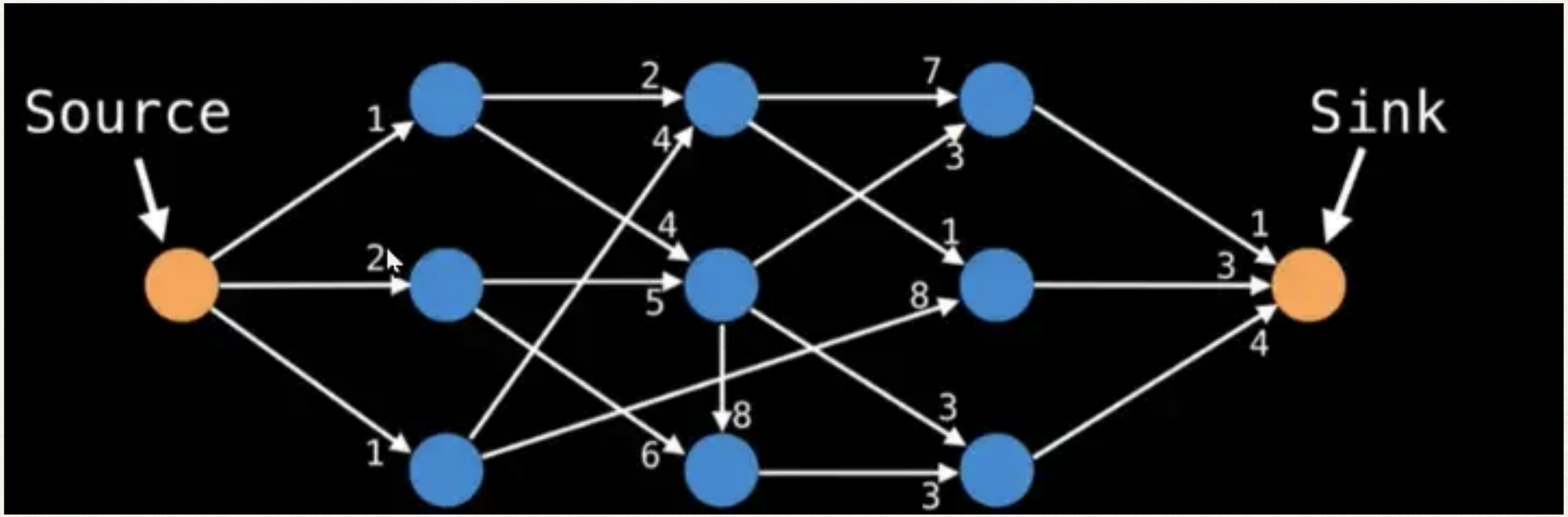
AJAY KUMAR

Codeforces

Network Flow's

Network flow: max flow –

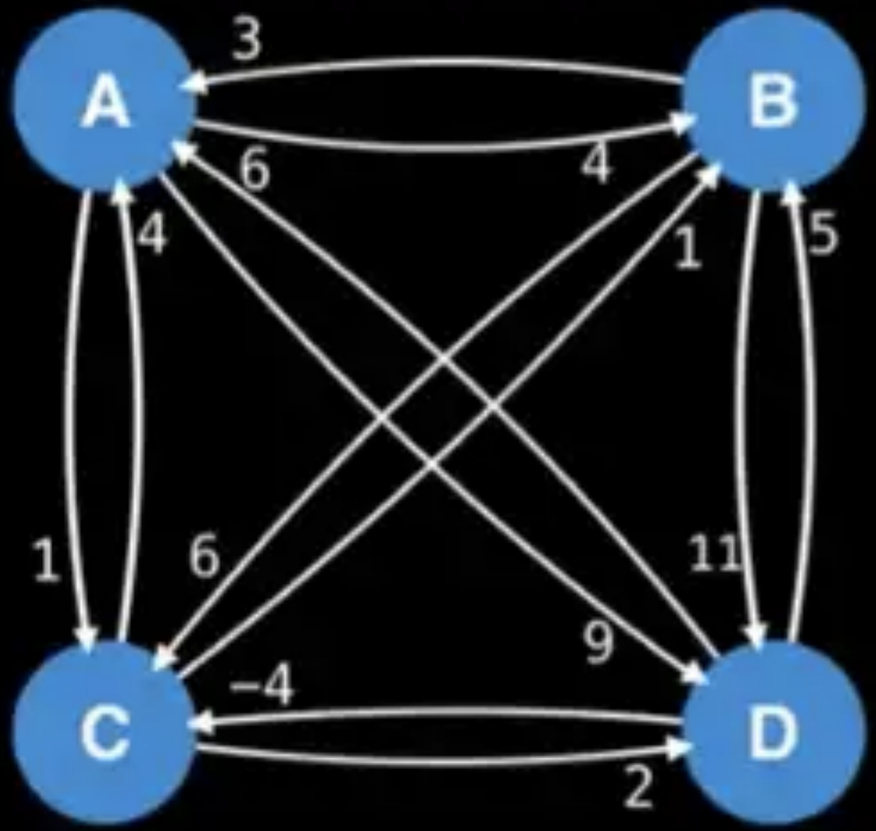
- Q: With an infinite input source how much "flow" can we push through the network?
- → Suppose the edges are roads with cars, pipes with water, or hallways with packed with people. Flow represents the volume of water allowed to flow through the pipes, the number of cars the roads can sustain in
  traffic, and the maximum amount of people that can navigate through the hallways.
- → question is important because at some point there is bound to be a bottleneck in our flow graph that limits the amount of stuff we can have traveling on the network making it from point A to point B the maximum flow would then represent things like the volume of water allowed to flow through the network of pipes the number of cars the roads can sustain traffic or the maximum amount of boats allowed on the river with these maximum flow problems. we can identify the bottlenecks that slow down the whole network and fix the edges that have lower capacities.
- → **Algorithms:** Ford-Fulkerson, Edmonds-Karp, and Dinic's algorithm

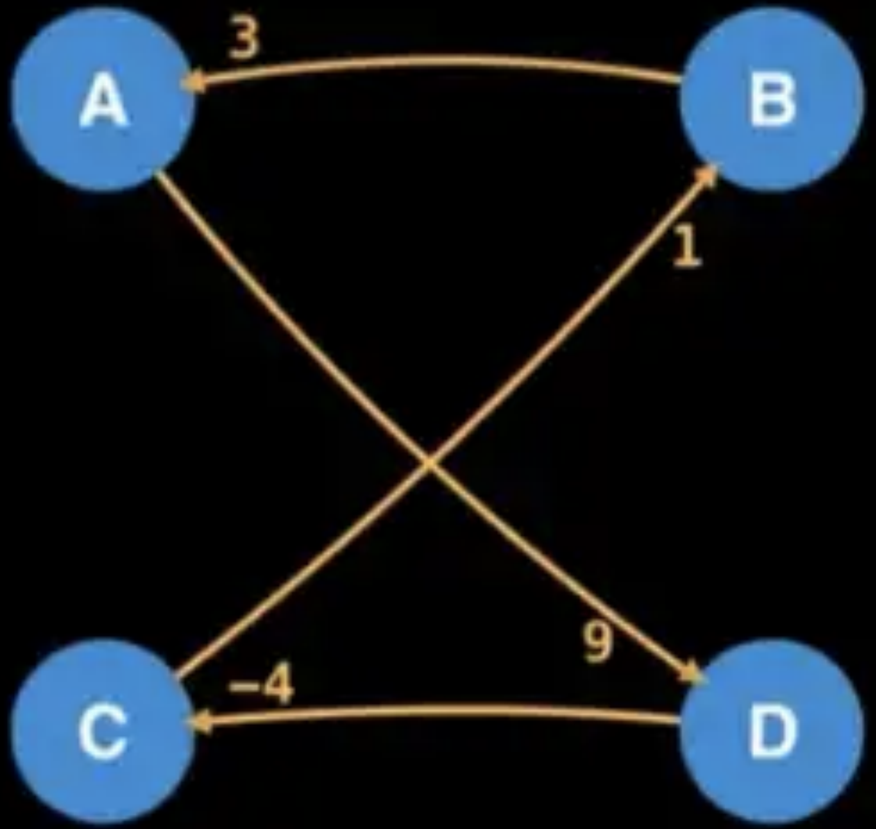

Source
Sink
1
2
7
4
3
2
4
1
3
5
8
4
1
8
3
6
3

Travelling salesman problem

Traveling salesman problem –

- “Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city exactly once and returns to the origin city?” – Wiki
- → TSP is an NP-hard problem
- → **Algorithms:** Held-Karp, branch and bound, and many approximation algorithms


A
B
C
D
3
6
4
4
1
5
1
6
11
9
−4
2


A
B
C
D
3
1
9
−4