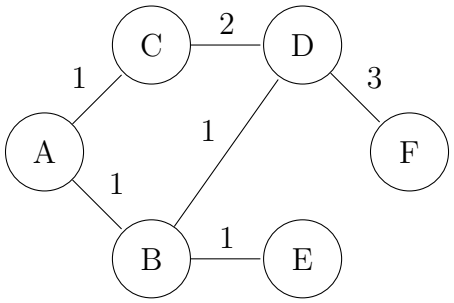
Foundations of Information Systems

Winter Semester 2023–24, Exercise 11

For discussion on Wednesday, February 6, 2024

1. Compute the shortest path from node A to every other node in the network, explicitly, using Dijkstra's algorithm. State the routing table for node A.



2. Repeat Problem 1, but using distance-vector routing. Draw, for each router, a table of the form

Destination	**Next Hop**	**Cost**
A		
B		
C		
D		
E		
F		

   which you should update in steps until it no longer changes.

3. In distance-vector routing, a malicious router could advertise a larger or smaller cost of sending packets to one or more destinations than it actually occurs. What could it gain? What does this mean for the network at large?

4. You are given the following relational database schema:

```
STUDENT(SNO, NAME)
ENROLL(CNO, SNO, GRADE)
COURSE(CNO, DEPT)
```

Write the following queries in relational algebra and SQL.

(a) Find the names of all students failing a course (`GRADE='F'`).

(b) Find the names of all students taking a course in the Math Department (`DEPT='MATH'`).