-- Week 15 Lab : Graph Theory

1— Find the Shortest path, using table :

Examples Dijkstra's Algorithm

Start
0

```
      s
     / \
    6   2
   /     \
  v       v
  a       c
```

a --6--> c

a --3--> b

a --5--> d

c --6--> a (label 6 between a and c)

c --5--> d

a --(-8)--> b (diagonal)

d --4--> b

d --(-1)--> e

Nodes: s, a, c, b, d, e

2— Find the shortest path, using table :

0
a
Start

```
a --4-- b --2-- c
 \      |      /|
  3     5    6  3
   \    |   /   |
    d --1-- e   |
    |      |
    5      5
    |      |
    f --2-- ... 
```

b --5-- d

b --3-- d (diagonal, value 3)

c --6-- e

d --1-- e

d --5-- f

e --5-- g

f --2-- (e)

f --7-- z

g --4-- z

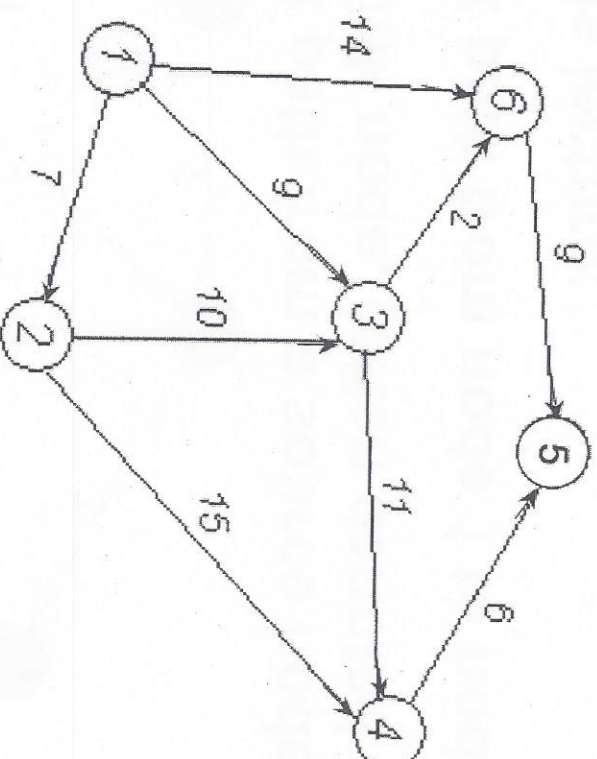Nodes: a, b, c, d, e, f, g, z
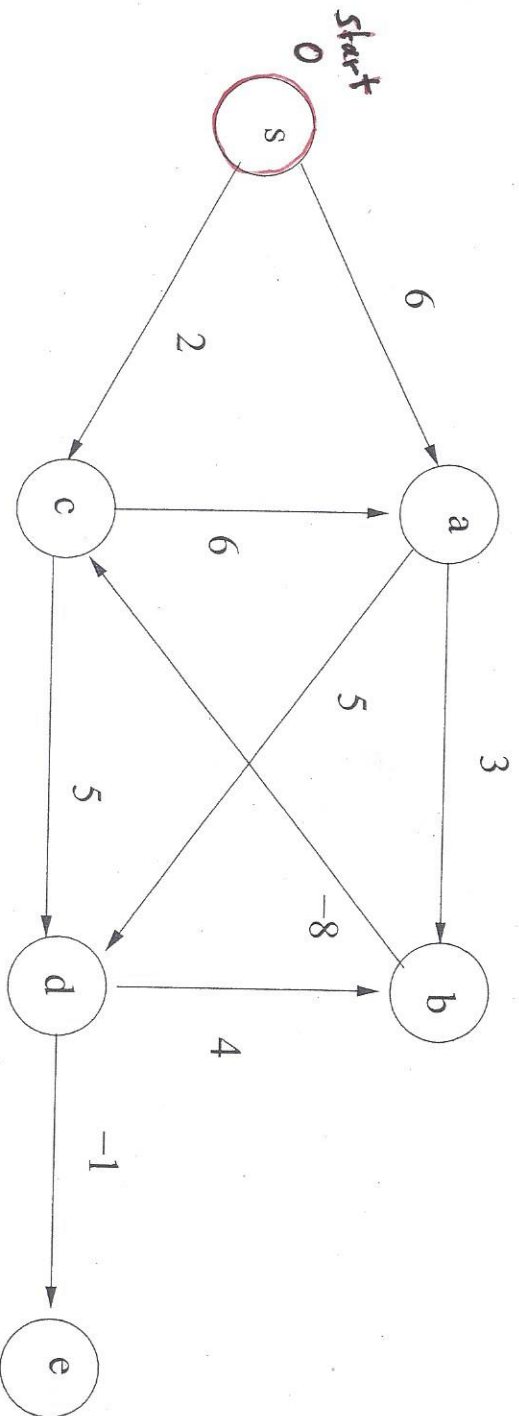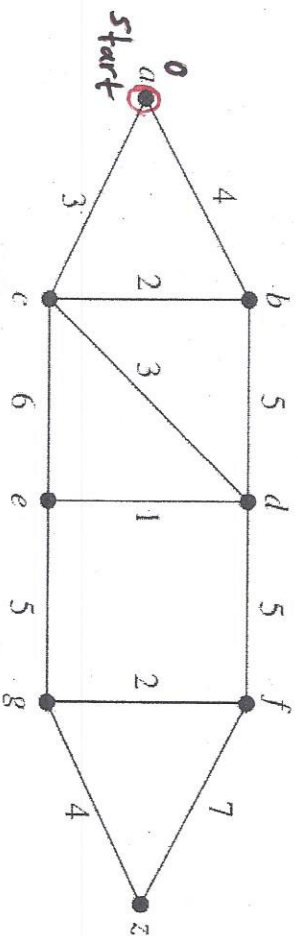
The Shortest Path Problem
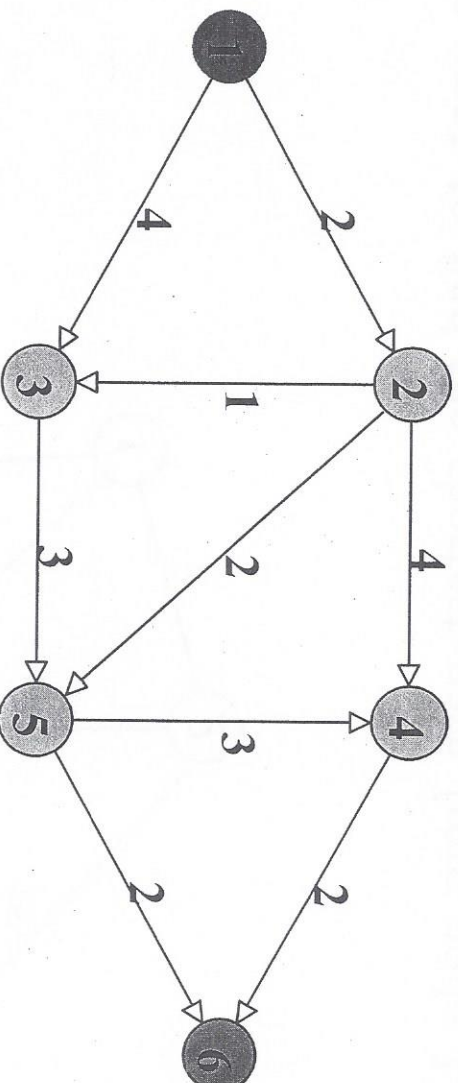
What is the shortest path from a source node (often denoted as s) to a sink node, (often denoted as t)?

What is the shortest path from node 1 to node 6?

Assumptions for this lecture:

1. There is a path from the source to all other nodes.
2. All arc lengths are non-negative

Dijkstra's Algorithm: Example

We want to find the shortest path from node 1 to all other nodes using Dijkstra's algorithm.