

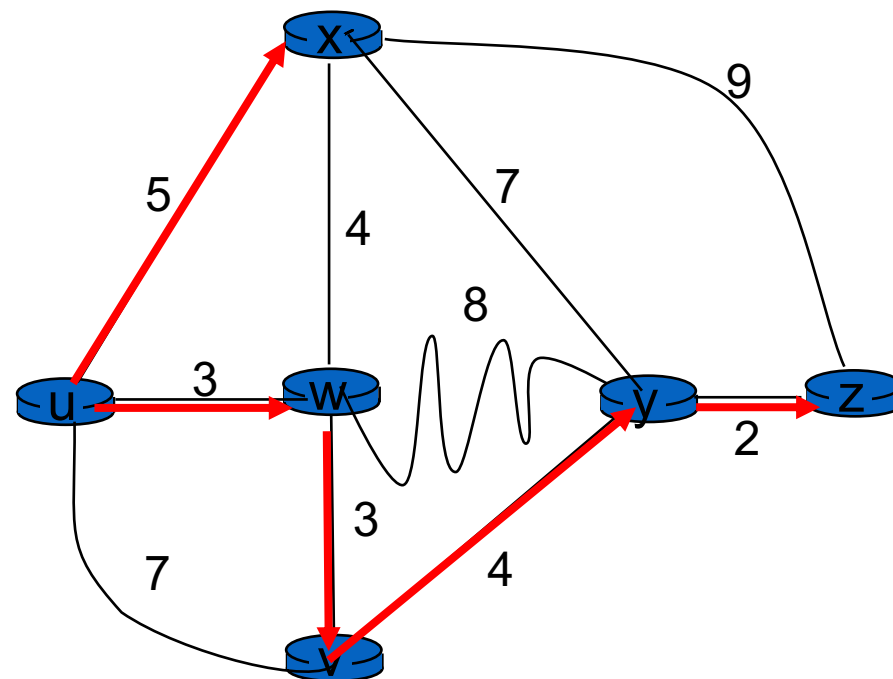
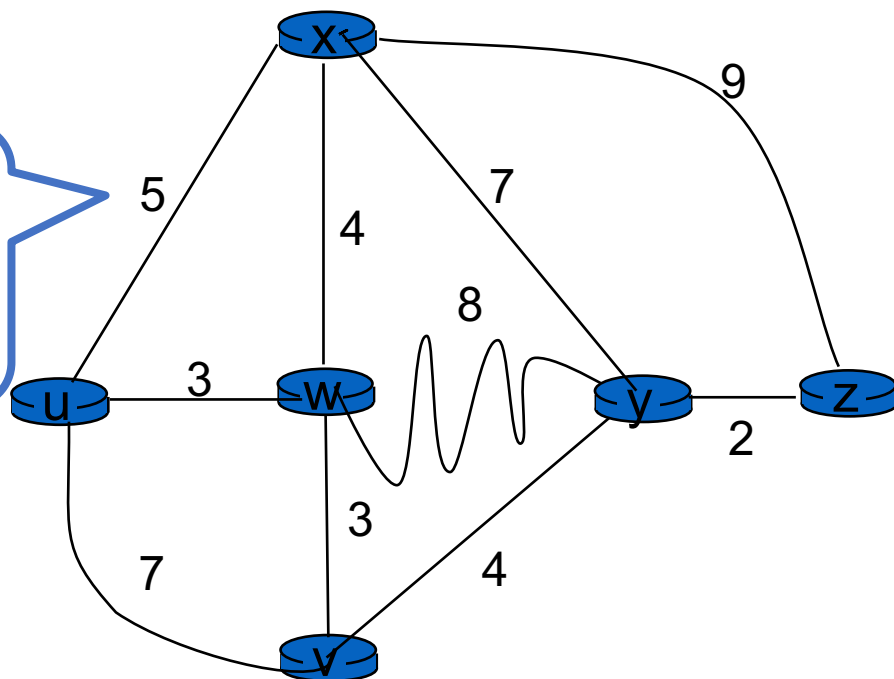
# Lab 3: Dijkstra's algorithm

HackMD: <https://hackmd.io/@KentShen/Hy2F6Pgv5>

# 實驗場景

- 輸入網路拓樸資料及起點
- 輸出shortest-path tree
- Python 3.8.10

本實驗將  
實作  
sender的  
部分

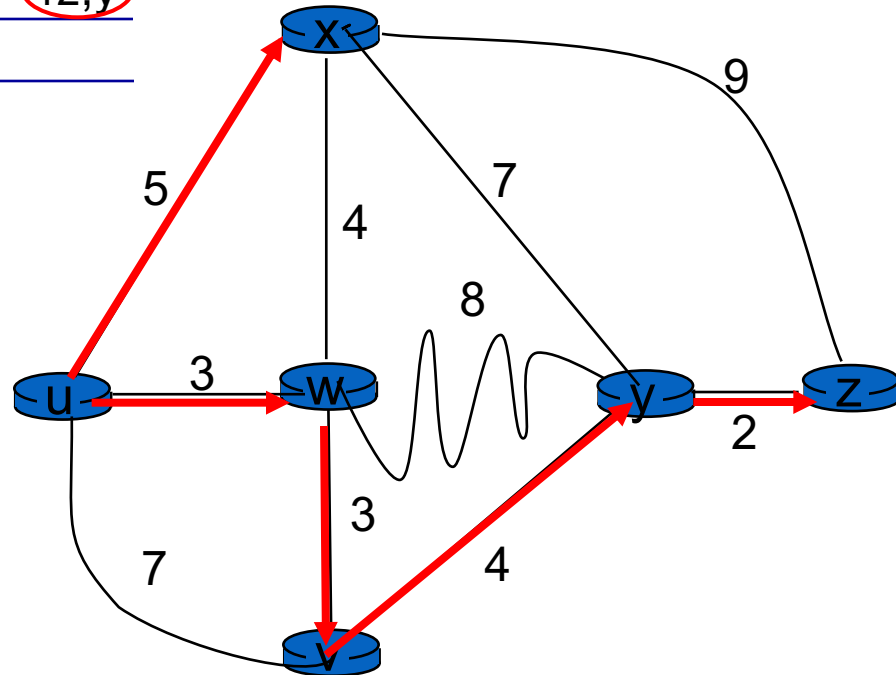


# Dijkstra's algorithm: example

Step	N'	D( <b>v</b> ) p(v)	D( <b>w</b> ) p(w)	D( <b>x</b> ) p(x)	D( <b>y</b> ) p(y)	D( <b>z</b> ) p(z)
0	u	7,u	<b>3,u</b>	5,u	$\infty$	$\infty$
1	uw	6,w		<b>5,u</b>	11,w	$\infty$
2	uwx	<b>6,w</b>			11,w	14,x
3	uwxv				<b>10,v</b>	14,x
4	uwxvy					<b>12,y</b>
5	uwxvyz					

## notes:

- ❖ construct shortest path tree by tracing predecessor nodes
- ❖ ties can exist (can be broken arbitrarily)



# 拓撲檔案

• input.txt

6

0 1 1

0 2 3

0 3 5

1 4 2

2 5 1

3 4 1

3 5 2

There are 6 nodes  
in the topology,  
which are node 0 to  
node 5

A link from node 3  
to node 5 with link  
cost 2

# topo.py

- Define a class named Topo
- Member variables:
  - numNodes: the number of nodes in the topology
  - links[<A>][<B>]: if larger than 0, there is a link from node <A> to node <B>
  - EX: links[2][3] = 5: the cost of link from node 2 to node 3 is 5
  - links[<A>][<B>] is equal to links[<B>][<A>]

# sp.py

```
from topo import Topo
import numpy as np
```

```
start = 0
```

```
myTopo = Topo('input.txt')
```

```
N = np.zeros((myTopo.numNodes, 1))
```

```
D = np.zeros((myTopo.numNodes, 1))
```

```
p = np.zeros((myTopo.numNodes, 1))
```

```
for i in range(myTopo.numNodes):
```

```
    D[i] = -1
```

```
    p[i] = -1
```

```
    N[i] = -1
```

```
N[0] = start
```

```
D[start] = 0
```

```
p[start] = start
```

**# TODO: your codes here**

```
for i in range(1, myTopo.numNodes):
```

```
    print(int(p[i]), ' --> ', i, ' cost = ', int(D[i]))
```

# 成果繳交

- 繳交檔案：sp.py
- 繳交時間：July 2, 2022