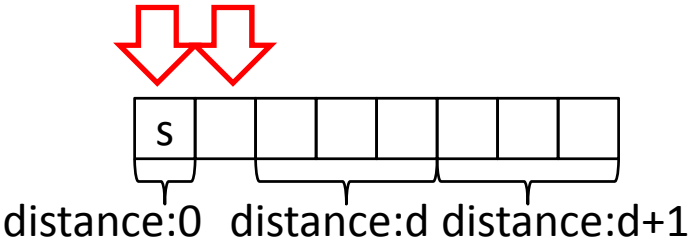
Quiz 8

(1) Make a program of breadth-first search (BFS).

(2) Show the final status of distance array and queue after BFS is done from vertex 0 of Karate club network.

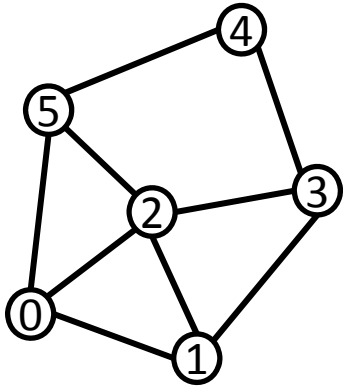
(3) Explain why BFS is not good for networks with varying edge lengths.

- Submit from Tokyo Tech OCW-i
- Deadline: ??:??(Japan Standard Time) on Jan. 9(Wed)
- Files should be MS Word, PDF or Zipped Jupyter notebook.



vertex	distance
0	0
1	-1
2	-1
3	-1
4	-1

Perform BFS on Karate club network. (not this tiny network)



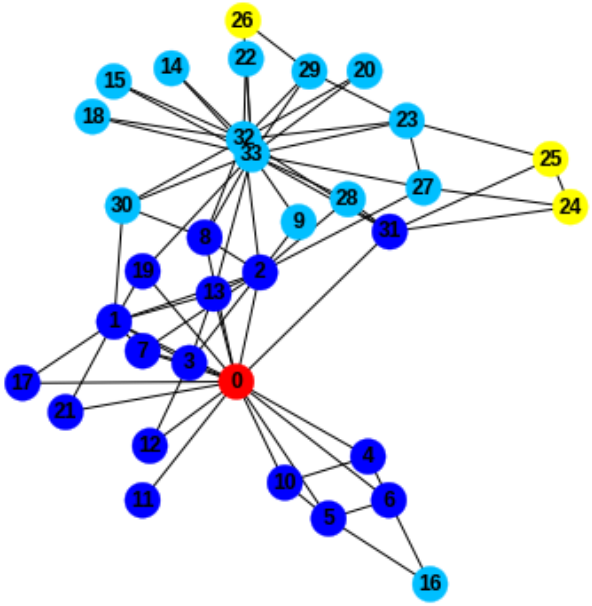
```python
import networkx as nx
import matplotlib.pyplot as plt
import numpy as np
import numpy.linalg as LA

G = nx.karate_club_graph()
known = [0] * nx.number_of_nodes(G)
dist = [-1] * nx.number_of_nodes(G)
lst = [-1] * nx.number_of_nodes(G)
read_pointer = 0
write_pointer = read_pointer + 1

colors = ['red', 'blue', 'deepskyblue', 'yellow', 'springgreen', 'lightskyblue', 'darkgreen', 'green', 'lightgreen', 'gray', 'lightgray']
color_map = ['black'] * nx.number_of_nodes(G)

lst[0] = 0 # start from node 0
dist[read_pointer] = 0 # distance 0
color_map[read_pointer] = colors[dist[read_pointer]]
known[read_pointer] = 1
```

```python
print(dist)
print(known)
print(lst)
plt.figure(figsize=(5, 5))
nx.draw_spring(G, node_size=400, node_color=color_map, with_labels=True, font_weight='bold')
```




```
[0, 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 2, 2, 2, 1, 2, 1, 2, 1, 2, 2, 3, 3, 3, 2, 2, 2, 2, 1, 2, 2]
```