

```
1 from queue import LinkedQueue
2 import numpy as np
3 class Graph:
4     def __init__(self, vertices):
5         self._adjMat = np.zeros((vertices, vertices))
6         self._vertices = vertices
7
8     def insert_edge(self, u, v, w=1):
9         self._adjMat[u][v] = w
10
11    def delete_edge(self, u, v):
12        self._adjMat[u][v] = 0
13
14    def get_edge(self, u, v):
15        return self._adjMat[u][v]
16
17    def vertices_count(self):
18        return self._vertices
19
20    def edge_count(self):
21        count = 0
22        for i in range(self._vertices):
23            for j in range(self._vertices):
24                if not self._adjMat[i][j] == 0:
25                    count += 1
26        return count
27
28    def indegree(self, u):
29        count = 0;
30        for i in range(self._vertices):
31            if not self._adjMat[i][u] == 0:
32                count += 1
33        return count
34
35    def outdegree(self, u):
36        count = 0;
37        for i in range(self._vertices):
38            if not self._adjMat[u][i] == 0:
39                count += 1
40        return count
41
42    def display(self):
43        print(self._adjMat)
44
45    def BFS(self, source):
46        i = source
47        q = LinkedQueue()
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```
48         visited = [0] * self._vertices
49         print(i, end=' - ')
50         visited[i] = 1
51         q.enqueue(i)
52
53         while not q.is_empty():
54             i = q.dequeue()
55             for j in range(self._vertices):
56                 if self._adjMat[i][j] == 1 and visited[j]
== 0:
57                     print(j, end=' - ')
58                     visited[j] = 1
59                     q.enqueue(j)
60
61 G = Graph(7)
62 G.insert_edge(0,1)
63 G.insert_edge(0,5)
64 G.insert_edge(0,6)
65 G.insert_edge(1,0)
66 G.insert_edge(1,2)
67 G.insert_edge(1,5)
68 G.insert_edge(1,6)
69 G.insert_edge(2,3)
70 G.insert_edge(2,4)
71 G.insert_edge(2,6)
72 G.insert_edge(3,4)
73 G.insert_edge(4,2)
74 G.insert_edge(4,5)
75 G.insert_edge(5,2)
76 G.insert_edge(5,3)
77 G.insert_edge(6,3)
78 G.BFS(0)
79
80
81
```