Lab1:

Graph with 5 vertices and 6 edges:

5 6

0	0	1
0	1	7
1	2	2
2	1	-1
1	3	8
2	3	5

We keep the graph in memory as followed:

```
class DIRECT_GRAPH {

private:
    int numberOfEdges, numberOfVertices;
    map <int, vector<int>> edgesIn;
    map <int, vector<int>> edgesOut;
    map <pair<int, int>, int>costs;
    vector <int> vertices;
```

edgesIn: map of edges that enters in a vertice, in our case - edgesIn[0]={0}, edgesIn[1]={0,2}, edgesIn[2]={1}, edgesIn[3]={1,2}

edgesOut: map of edges gets out of a vertice, in our case - edgesOut[0]={0, 1}, edgesIn[1]={2,3}, edgesIn[2]={1,3}

costs: vector that contains the cost for every vertice, in our case - costs[<0,0>]={1}, costs[<0,1>]={7}, costs[<1,2>]={2}, costs[<2,1>]={-1}, costs[<1,3>]={8} , costs[<5,3>]={5}

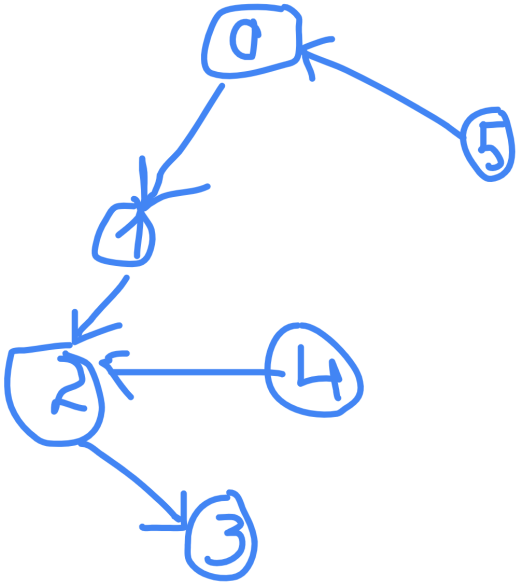
vertices: list of vertices, from 0 to 5

Lab2:
Graph with 5 vertices and 5 edges
5 5
0 1 3
1 2 4
2 3 5
4 2 2
5 0 2

I follow the given documentation:

```
vector<int> DIRECT_GRAPH::bfsFromEndToStart(int source)
{
    queue<int> q;
    vector<int>p(numberOfVertices);
    vector<int>l(numberOfVertices);
    map<int, bool>visited;
    q.push(source);
    visited[source] = 1;
    l[source] = 0;
    while (!q.empty()) {
        int x = q.front();
        q.pop();
        for(int y = 0; y < edgesIn[x].size(); ++y)
            if (visited[edgesIn[x][y]] == 0) {
                q.push(edgesIn[x][y]);
                visited[edgesIn[x][y]] = 1;
                l[edgesIn[x][y]] = l[x] + 1;
                p[edgesIn[x][y]] = x;
            }
    }
    return p;
}
```

q - queue with vertices you have to visit
p - vector, where at a given position x you have the predecessor of the vertice x on the shortest path from x to the source
l - vector, contains the shortest path's length from source to the other vertices



source = 3,
target = 0,

	0	1	2	3	4	5
l	3	2	1	0	-	-
p	1	2	3	-	-	-