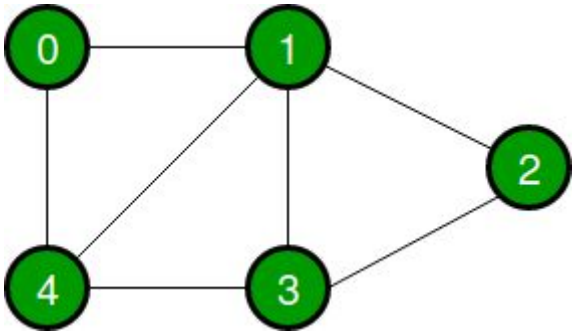
TAD <Graph>




{inv: $EdgeQ <= VertexQ \wedge$ *Edges must relate two vertices* }

Primitive Operations:

- ❏ addVertex: Graph x value x vertex → Graph
- ❏ deleteVertex: Graph x value → Graph
- ❏ searchVertex: Graph → value
- ❏ updateVertex: Graph x value x vertex → Graph
- ❏ bFS Graph x vertex → Graph
- ❏ dFS Graph x vertex → Graph
- ❏ dijkstra: Graph x vertex → Graph
- ❏ floydWarshall: Graph x vertex → Graph
- ❏ prim: Graph x vertex → Tree
- ❏ kruskal: Graph x vertex → Tree

| addVertex |
| --- |
| Adds a vertex to the graph as a relation with a given vertex. |
| pre: Graph is already initialized. |
| pos: A value was added to the graph adjacent/related to the given vertex. |

| deleteVertex |
| --- |
| Deletes a vertex from the graph, making the necessary relation fixes on its relations |
| pre: Graph is already initialized. |
| pos: A value was deleted from the |

| graph |
| --- |

| searchVertex |
| --- |
| Search a vertex with a given key in the graph. |
| pre: Graph is already initialized. |
| pos: vertex value if it was found on the graph, null if it wasn’t. |

| updateVertex |
| --- |
| Searches the vertex with the given key and, if found, changes its value to the new one. |
| pre: Graph is already initialized. |
| pos: new vertex value if it was found on the graph and replaced, null if it wasn’t. |

| BFS |
| --- |
| Travels the graph by breadth. Visiting each neighbour vertices before going deeper, until all vertices are visited. |
| pre: Graph is already initialized. |
| pos: List showing the vertices of the graph. |

| DFS |
| --- |
| Travels the graph by depth. Visiting each relation of each vertex before going wider, until all vertices are visited. |
| pre: Graph is already initialized. |
| pos: List showing the vertices of the graph. |

| Dijkstra |
| --- |
| Travels the graph from a given vertex returning the minimum path to each of them |
| pre: Graph is already initialized. |
| pos: List showing the minimum paths. |

| Floyd-Warshall |
| --- |
| Travels the graph from a given vertex returning the minimum path to each pair. |
| pre: Graph is already initialized. |
| pos: Length of shortest paths between all vertices. |

| Prim |
| --- |
| Travels the graph from a given vertex returning the minimum spanning tree including every vertex. |
| pre: Graph is already initialized. |
| pos: A tree with every vertex of the graph. |

| Kruskal |
| --- |
| Travels the graph from a given vertex returning the minimum spanning forest including every vertex. |
| pre: Graph is already initialized. |
| pos: A forest with every vertex. |