**GRAPH TAD**

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| TAD <Graph> |
| Graph = {ArrayList, Matrix} |
| Inv: {vertex must be different from null and vertices amount must be greater than 0} |
| Primitive Operations:  AddVertex(vertex): -> void  FindVertex(data): -> Vertex  RemoveVertex(vertex): -> void  AddEdge(source, destination, weight): -> void  RemoveEdge(source, destination): -> void  DFS(startVertex): -> void  BFS(startVertex): -> void  Dijkstra(startVertex, endVertex): -> ArrayList<Vertex>  FloydWarshall(): -> int[][]  Prim(startVertex): -> Graph  Kruskal(): -> Graph  GetVertices(): -> ArrayList<Vertex> |

**OPERATIONS**

**AddVertex**

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| AddVertex(vertex): -> void  {pre: vertex}  {pos: vertices.contains(vertex)}  “Creates a new vertex and adds it to the graph” |

**FindVertex**

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| FindVertex(data): -> Vertex  {pre: data}  {pos: returns the vertex with the specified data}  “Finds a vertex by its data” |

**RemoveVertex**

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| RemoveVertex(vertex): -> void  {pre: vertices.contains(vertex)}  {pos: !vertices.contains(vertex)}  “Removes a vertex from the graph” |

**AddEdge**

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| AddEdge(source, destination, weight): -> void  {pre: vertices.contains(source) && vertices.contains(destination)}  {pos: Edge between source and destination with the specified weight is added}  “Adds an edge between two vertices with a given weight” |

**RemoveEdge**

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| RemoveEdge(source, destination): -> void  {pre: vertices.contains(source) && vertices.contains(destination)}  {pos: Edge between source and destination is removed}  “Removes an edge between two vertices” |

**DFS**

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| DFS(startVertex): -> void  {pre: vertices.contains(startVertex)}  {pos: Depth-First Search is performed starting from the specified vertex}  “Performs Depth-First Search starting from a given vertex” |

**BFS**

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| BFS(startVertex): -> Void  {pre: vertices.contains(startVertex)}  {pos: Breadth-First Search is performed starting from the specified vertex}  “Performs Breadth-First Search starting from a given vertex” |

**Dijkstra**

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| Dijkstra(startVertex, endVertex): -> ArrayList<Vertex>  {pre: vertices.contains(startVertex) && vertices.contains(endVertex)}  {pos: Returns the shortest path between startVertex and endVertex}  “Applies Dijkstra's algorithm to find the shortest path between two vertices” |

**FloydWarshall**

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| FloydWarshall(): -> int[][]  {pre: true}  {pos: Returns the matrix of all-pair shortest paths}  “Applies Floyd-Warshall algorithm to find all-pair shortest paths” |

**Prim**

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| Prim(startVertex): -> Graph  {pre: vertices.contains(startVertex)}  {pos: Returns a graph representing the minimum spanning tree generated using Prim's algorithm}  “Applies Prim's algorithm to generate a minimum spanning tree” |

**Kruskal**

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| Kruskal(): -> Graph  {pre: true}  {pos: Returns a graph representing the minimum spanning tree generated using Kruskal's algorithm}  “Applies Kruskal's algorithm to generate a minimum spanning tree” |

**GetVertices**

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| GetVertices(): -> ArrayList<Vertex>  {pre: true}  {pos: Returns the list of vertices in the graph}  “Gets the list of vertices in the graph” |