1a. Describe the graph that you need to build in order to reformulate the problem as a one-way street problem, with a formal definition of the set of nodes and the set of edges.

* Given an undirected graph G (V, E), where V is the set of vertices and E is the set of edges joining these vertices, traversal over G can be reformulated as a one-way street problem, if it meets the following observations:
  + Every vertex vi Є V of the graph represents a point on a “street” where the direction may be changed. In context of the hospital floor maps, the vertices are either the locations on the hallways/corridors where the patient can enter/exit one or more rooms, or they are the locations where one hallway/corridor meets another. For example, in the figure below, if A is a point where the patient is currently on the hallway/corridor, they can enter a room, or they can travel to point B and enter one of the available rooms there. Otherwise, they can continue to point C, which is intersection of two corridors, and opt to change their direction there.

\*\*NEED A VISUAL REPRESENTATION HERE\*\*

* + Every edge ei{va,vb} Є E of the graph represents a path connecting two vertices va and vb. Edges only approximately represents the “streets” of our one-way street problem, since they do not adhere to the physical curves on the streets. In context of the hospital floor maps, the edges approximately represent the path between different points on the on the hallways/corridors (where the patient can enter/exit one or more rooms), or the intersection points of the corridors, or a combination of both. For example, in the above figure the path between point A and B is called an edge. A patient can use this path to travel through the corridor from point A to B.
  + The graph G (V,E) is a connected graph, i.e., every pair of vertices in the graph are connected. This means that there is a path from any vertex to any other vertex in the graph. In context of our hospital floor maps, all points on the corridors (which lead to rooms) must be connected through corridors.
  + There is no bridge in the graph. A bridge is any edge α in the graph, such that the removal of the edge (but not its end vertices) results in a disconnected graph. In context of the hospital floor maps, a bridge is the path between any two points A and B on any of the corridors (where {A,B} Є E), such that if the corridor is blocked, there is no other path to travel from point A to point B.

\*\*NEED A VISUAL REPRESENTATION OF BRIDGE FROM BOOK HERE\*\*

Outside of this representation, our th

2a. Describe the graph that you need to build in order to reformulate the problem as a one/two-way street problem, with a formal definition of the set of nodes and the set of edges

* Given an undirected graph G (V, E), where V is the set of vertices and E is the set of edges joining these vertices, traversal over G can be reformulated as a one-way street problem, if it meets the following observations:
  + Every vertex vi Є V of the graph represents a point on a “street” where the direction may be changed. In context of the hospital floor maps, the vertices are either the locations on the hallways/corridors where the patient can enter/exit one or more rooms, or they are the locations where one hallway/corridor meets another. For example, in the figure below, if A is a point where the patient is currently on the hallway/corridor, they can enter a room, or they can travel to point B and enter one of the available rooms there. Otherwise, they can continue to point C, which is intersection of two corridors, and opt to change their direction there.

\*\*NEED A VISUAL REPRESENTATION HERE\*\*

* + Every edge ei{va,vb} Є E of the graph represents a path connecting two vertices va and vb. Edges only approximately represents the “streets” of our one-way street problem, since they do not adhere to the physical curves on the streets. In context of the hospital floor maps, the edges approximately represent the path between different points on the on the hallways/corridors (where the patient can enter/exit one or more rooms), or the intersection points of the corridors, or a combination of both. For example, in the above figure the path between point A and B is called an edge. A patient can use this path to travel through the corridor from point A to B.
  + The graph G (V,E) is a connected graph, i.e., every pair of vertices in the graph are connected. This means that there is a path from any vertex to any other vertex in the graph. In context of our hospital floor maps, all points on the corridors (which lead to rooms) must be connected through corridors.
  + If there is a bridge in the graph, it should have higher weight. A bridge is any edge α in the graph, such that the removal of the edge (but not its end vertices) results in a disconnected graph. Weight is an integer value associated with edge which represents comparative importance of the edge. In context of the hospital floor maps, a bridge is the path between any two points A and B on any of the corridors (where {A,B} Є E), such that if the corridor is blocked, there is no other path to travel from point A to point B. However, if the corridor can have multiple lanes for the patient to go through, then it is assumed that the weight for the edge, with respect to any two points on this corridor, is higher.

\*\*NEED A VISUAL REPRESENTATION OF BRIDGE FROM BOOK HERE\*\*

3a. Describe the graph (if different from previous questions) that you need to build in order to reformulate the problem as a one/two-way street problem, with a formal definition of the set of nodes and the set of edges

* Given an undirected graph G (V, E), where V is the set of vertices and E is the set of edges joining these vertices, traversal over G can be reformulated as a one-way street problem, if it meets the following observations:
  + Every vertex vi Є V of the graph represents a point on a “street” where the direction may be changed. In context of the hospital floor maps, the vertices are either the locations on the hallways/corridors where the patient can enter/exit one or more rooms, or they are the locations where one hallway/corridor meets another. For example, in the figure below, if A is a point where the patient is currently on the hallway/corridor, they can enter a room, or they can travel to point B and enter one of the available rooms there. Otherwise, they can continue to point C, which is intersection of two corridors, and opt to change their direction there.

\*\*NEED A VISUAL REPRESENTATION HERE\*\*

* + Every edge ei{va,vb} Є E of the graph represents a path connecting two vertices va and vb. Edges only approximately represents the “streets” of our one-way street problem, since they do not adhere to the physical curves on the streets. In context of the hospital floor maps, the edges approximately represent the path between different points on the on the hallways/corridors (where the patient can enter/exit one or more rooms), or the intersection points of the corridors, or a combination of both. For example, in the above figure the path between point A and B is called an edge. A patient can use this path to travel through the corridor from point A to B.
  + The graph G (V,E) is a connected graph, i.e., every pair of vertices in the graph are connected. This means that there is a path from any vertex to any other vertex in the graph. In context of our hospital floor maps, all points on the corridors (which lead to rooms) must be connected through corridors.
  + There is no bridge in the graph.. A bridge is any edge α in the graph, such that the removal of the edge (but not its end vertices) results in a disconnected graph. In context of the hospital floor maps, a bridge is the path between any two points A and B on any of the corridors (where {A,B} Є E), such that if the corridor is blocked, there is no other path to travel from point A to point B.

\*\*NEED A VISUAL REPRESENTATION OF BRIDGE FROM BOOK HERE\*\*