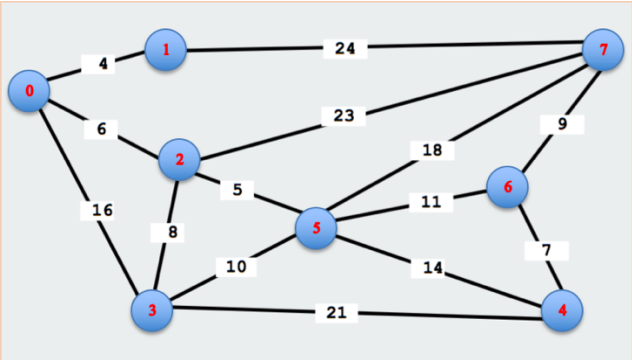
Minimum Spanning Tree

To Turn in: Please answer each question below and put your answers into a pdf file. Then zip up the pdf file into a zip file and turn in the zip file on canvas.

1 a) (50%) Using the following example graph, with the weights labeled on each edge, please **explain step-by-step** how **Kruskal's** algorithm computes the Minimum Spanning Tree(MST). Specifically, you have to describe **how** and **why** the algorithm picks the next edge to add to the MST. And each time when an edge is selected and added to the MST, you have to show me the current set of edges in the MST. In your answer, **e(0-2)** may mean the edge from vertex 0 to vertex 2. You can use symbols **MST={e(i-j), e(m-n),…..}** to describe the set of edges in MST, where **i**, **j** and **m** and **n** are particular vertices in the graph.



1b) Please prove that the **Kruskal's** algorithm is able to correctly compute MST. In your proof if you will use any property theorem that we have learned, please explicitly describe the entire proposition and the content of that property theorem. (30%)

1c) Please analyze the time complexity of the **Kruskal's** algorithm if we use the most efficient data structure that is applicable in the implementation, as we learned in the classroom. If you provide a result but without logic justifications, you will get a zero. (20%)