2. Use Prim’s algorithm (Algorithm 4.1) to find a minimum spanning tree for the following graph. Show the actions step by step.

3. Use Dijkstra’s algorithm (Algorithm 4.3) to find the shortest paths from the vertex $v_4$ to all the other vertices of the graph in Exercise 2. Show the actions step by step. Assume that each undirected edge represents two directed edges with the same weight.

36. Use a greedy approach to construct an optimal binary search tree by considering the most probable key, $Key_k$, for the root, and constructing the left and right subtrees for $Key_1, Key_2, \ldots, Key_{k-1}$ and $Key_{k+1}, Key_{k+2}, \ldots, Key_n$ recursively in the same way.

   (a) Assuming the keys are already sorted, what is the worst-case time complexity of this approach? Justify your answer.

   (b) Use an example to show that this greedy approach does not always find an optimal binary search tree.

37. Write program - show output with data

37. Suppose we assign $n$ persons to $n$ jobs. Let $C_{ij}$ be the cost of assigning the $i$th person to the $j$th job. Use a greedy approach to write an algorithm that finds an assignment that minimizes the total cost of assigning all $n$ persons to all $n$ jobs. Analyze your algorithm and show the results using order notation.

46. Write program

46. Use a greedy approach to write an algorithm for the Traveling Salesperson problem. Show that your algorithm does not always find a minimum-length tour.