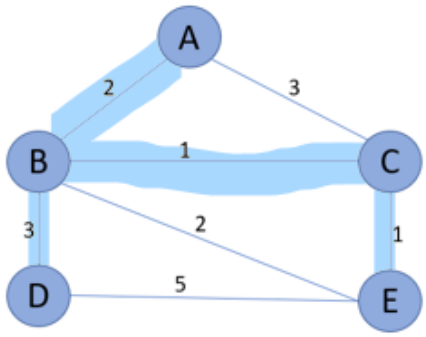
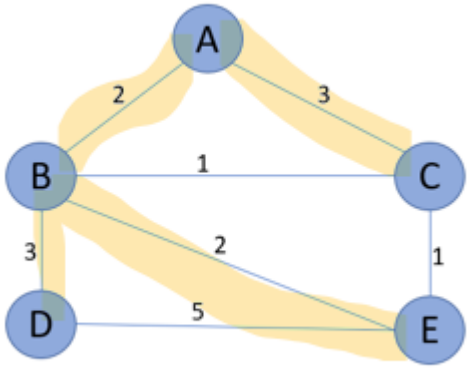
Assignment: Graph Algorithms - II

1. **Draw Minimum Spanning Tree**
   a. Draw minimum spanning tree for the below graph.



   b. Draw spanning Tree that is not minimum



2. **MST implementation:**
   a. Implement Prims' algorithm Name your function **Prims(G)**

Input Graph in the form of a 2D matrix.

```
G = [[0, 2, 0, 6, 0],
  [2, 0, 3, 8, 5],
  [0, 3, 0, 0, 7],
 [6, 8, 0, 0, 9],
 [0, 5, 7, 9, 0]]
```

Output:

Prints the MST:

0 - 1 : 2

1 - 2 : 3

0 - 3 : 6

1 - 4 : 5

```
def Prims(G):
    verticesCount = len(G)

    dist = [float('inf')] * verticesCount
    parent = [None] * verticesCount

    dist[0] = 0  # picking first vertex and marking it's distance
to 0

    mst = [False] * verticesCount

    parent[0] = -1

    for i in range(verticesCount):
        min = float('inf')

        for v in range(verticesCount):
            if dist[v] < min and mst[v] == False:
                min = dist[v]
                min_vertex = v

        mst[min_vertex] = True # including min_vertex to MST

        #checking for next nearest vertex that is coming out of
our region of vertices
        for v in range(verticesCount):
            if (G[min_vertex][v] > 0 and mst[v] == False and
dist[v] > G[min_vertex][v]):
                dist[v] = G[min_vertex][v]
                parent[v] = min_vertex

    # printing
    for i in range(1, verticesCount):
        print(parent[i], "-", i, ":", G[i][parent[i]])


G = [[0, 2, 0, 6, 0],
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     [0, 3, 0, 0, 7],
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     [0, 5, 7, 9, 0]]

Prims(G)
```

b. What is the difference between the Kruskal's and the Prim's algorithm?

Sample answer: Kruskal's starts to build the MST starting from the min edge of the graph but Prims builds the MST starting from any random vertex.

Any other answer that shows difference is also acceptable.

3. **Apply BFS/DFS/MST to solve a problem (Portfolio Project Problem):**
Whenever you are asked to find minimum path to a destination in a graph you can use BFS.

No solution is provided here. You can share your solutions for this problem post due date on Teams/Ed and discuss there.