SIENAcollege
Computer Science

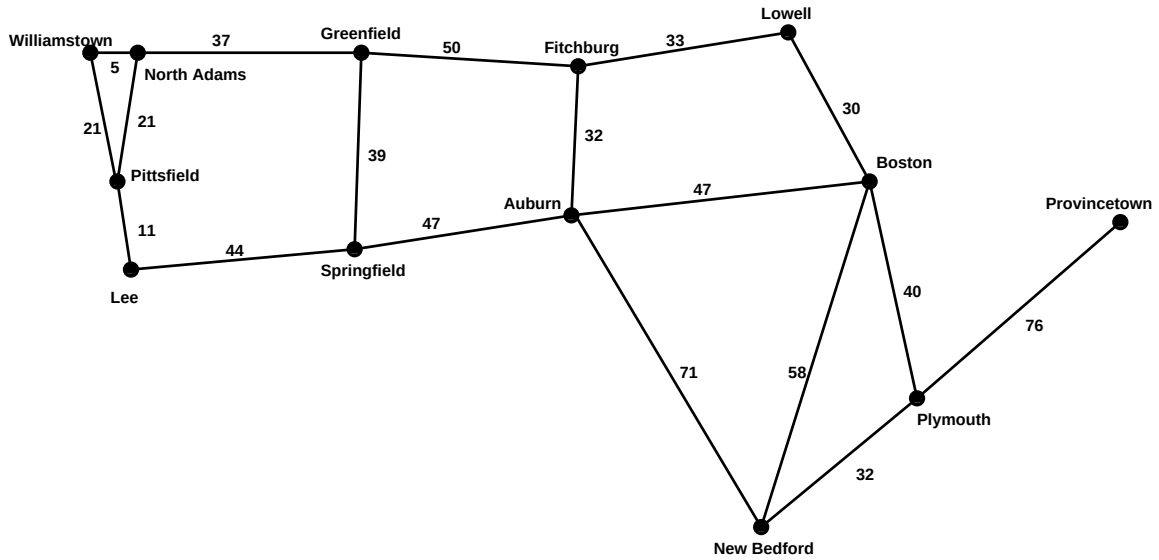
Computer Science 385
Design and Analysis of Algorithms
Siena College
Spring 2017

Topic Notes: Dijkstra's Algorithm Example

Pseudocode:

```
// G is the graph, s is the starting vertex
ALGORITHM dijkstra(G=(V,E), s)
    T <- empty map
    PQ <- empty priority queue

    //mark all vertices in V as unvisited
    for each v in V
        v.visited <- false

    // we "found" the start at distance 0
    T.add(s, (0, null))
    s.visited <- true

    // add each edge (s,v) of G to PQ with appropriate value
    for each edge (s,v) in G
        PQ.add((s,v), (s,v).cost)

    // main loop
    while (T.size() < G.size() and PQ not empty)
        // removed edges until we find one such that one vertex
        // is visited and the other is unvisited
        do
            if PQ is empty then break
            (u,v) <- PQ.remove()
        until u.visited != v.visited or PQ is empty

        // WLOG, assume v is visited (in T) and u is
        //     unvisited (not in T)
        // we found a way to u
        ucost <- T.get(v).cost + (v,u).cost
        T.add(u, (ucost, (v,u)))
        u.visited <- true
        for each neighbor w of u
            if w.visited = false
               PQ.add((u,w), ucost + (u,w).cost)
    return T
```

Graph to work with:



Result "tree"/table/map:

Place	(distance,last-edge)
W'town	(0, `null`)

Priority queue:

(distance,last-edge)	Seq