MST:

```
MST-PRIM(G, w, r)
 1  for each u ∈ G.V
 2      u.key = ∞
 3      u.π = NIL
 4  r.key = 0
 5  Q = G.V
 6  while Q ≠ ∅
 7      u = EXTRACT-MIN(Q)
 8      for each v ∈ G.Adj[u]
 9          if v ∈ Q and w(u, v) < v.key
10              v.π = u
11              v.key = w(u, v)
```

min-heap → BUILD-MIN-HEAP

O(V) time ⇒ Line 1-5

Each operation takes O(log V)

Total time taken in EXTRACT-MIN for all vertices = O(V log V)

|V| times

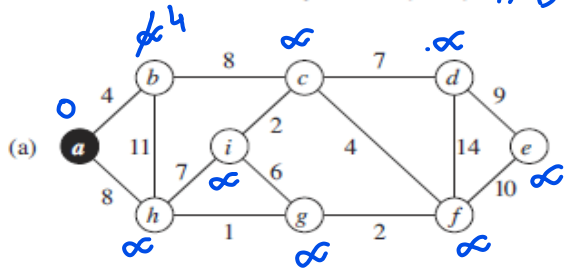
|E| times

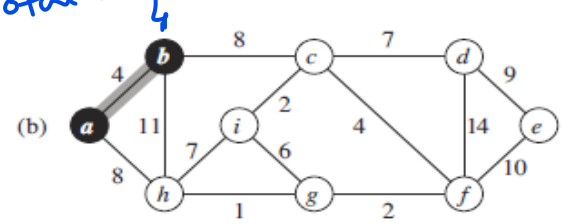
4 < ∞

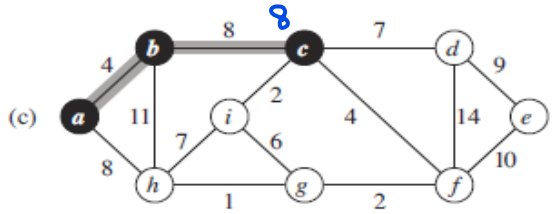
Time complexity = O(E log V + V log V) = O(E log V) (As |E| ≥ |V|-1)

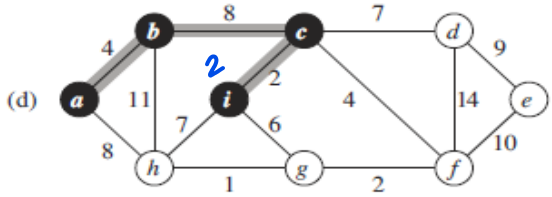
// DECREASE-KEY → O(log V)

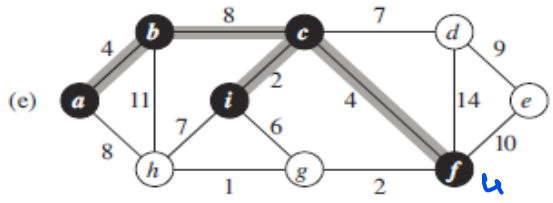
Total time taken in this step = O(E log V)

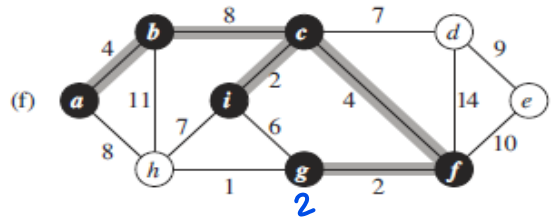


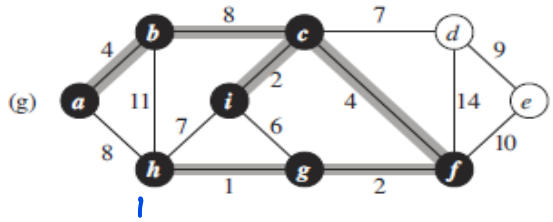


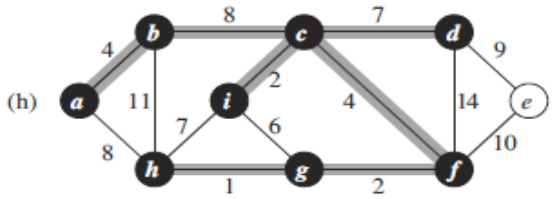


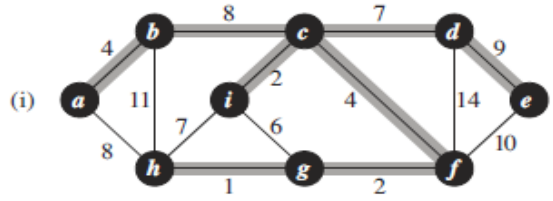
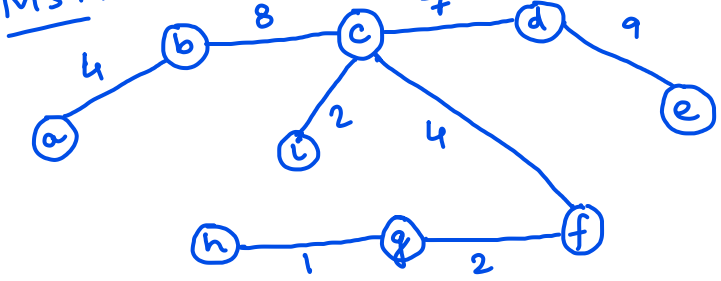












MST: Total weight = 37