Lecture 9.2: Prim's Algorithm

```
MST-Prim(G, w, r)
    Q = V[G];
    for each u \in Q
                           14
         key[u] = \infty;
                                                      15
    key[r] = 0;
    p[r] = NULL;
                                          8
    while (Q not empty)
                                    Run on example graph
         u = ExtractMin(Q);
         for each v \in Adj[u]
              if (v \in Q \text{ and } w(u,v) < \text{key}[v])
                   p[v] = u;
                   key[v] = w(u,v);
```

```
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MST-Prim(G, w, r)
     Q = V[G];
                                                     00
                                 \infty
                                                                      \infty
     for each u \in Q
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          key[u] = \infty;
                                         10
                                                             15
     key[r] = 0;
                                 \infty
                                                     \infty
                                                                      \infty
     p[r] = NULL;
                                           \infty
     while (Q not empty)
                                         Run on example graph
          u = ExtractMin(Q);
           for each v \in Adj[u]
                if (v \in Q \text{ and } w(u,v) < \text{key}[v])
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                                  \infty
                                                                       \infty
     for each u \in Q
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           key[u] = \infty;
                                         10
                                                              15
     key[r] = 0;
                                                      \infty
                                                                       \infty
     p[r] = NULL;
                                            \infty
     while (Q not empty)
                                           Pick a start vertex r
           u = ExtractMin(Q);
           for each v \in Adj[u]
                if (v \in Q \text{ and } w(u,v) < \text{key}[v])
                      p[v] = u;
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     for each u \in Q
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          key[u] = \infty;
                                        10
                                                            15
     key[r] = 0;
                                                    \infty
                                                                     \infty
     p[r] = NULL;
                                           \infty
     while (Q not empty)
          u = ExtractMin(Q); Black vertices have been removed from Q
           for each v \in Adj[u]
                if (v \in Q \text{ and } w(u,v) < \text{key}[v])
                     p[v] = u;
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                                                                      \infty
     p[r] = NULL;
                                           3
     while (Q not empty)
                                     Black arrows indicate parent pointers
          u = ExtractMin(Q);
           for each v \in Adj[u]
                if (v \in Q \text{ and } w(u,v) < \text{key}[v])
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