```
1: \{d(a, z), \text{ shortest path}\} shortestPath (weighted, connected, simple graph G,
                                          vertex a_i, vertex z)
 2:
        # Initialization
 3:
       B = \{a\}
                  # initial iteration
 4:
       n = 0
 5:
       r = a
                 # the most recent vertex added to B
 6:
       d(a, a) = 0 # the distance from a to a is known
 7:
       for each vertex v in G - \{a\}
 8:
          d_0(v) = \infty
 9:
        # Start the main loop
       while z \notin B
10:
11:
           n = n + 1
           A becomes the set of vertices in V – B which are adjacent to r
12:
13:
           for each vertex, u in A
                                                  # a shorter estimate may be possible
              d_n(u) = \min\{d_{n-1}(u), d(a, r) + w(r, u)\}
14:
15:
              if d_n(u) \neq d_{n-1}(u)
16:
                  p(u) = r
                                # u is currently best reached by passing through r
17:
           for each vertex, v \in (V - A) # no change in the estimate
18:
              d_n(v) = d_{n-1}(v)
19:
           x = a vertex in V-B with minimum value for d_n(u) among vertices u \in V-B
20:
           d(a, x) = d_n(x) # the true distance from a to x is now known
21:
           add x to B
22:
           r = x
                                      \# x becomes the most recently added vertex
23:
       \# z has been reached, now construct the path
       P = an ordered list with z as its only element
24:
                                                                 # start building the path
25:
       r = z
                                        # the most recently added vertex
26:
       while r \neq a
27:
                                   \# r can be reached by passing through x
           x = p(r)
28:
           prepend x to P
                                   # add next vertex to the front of P
29:
           r = x
30:
       return \{d(a, z), P\}
31: end shortestPath
        u
                        т
                q
                                             d
         B
               r
                     Α
                                               t
                                                    т
                                                              z
                                                                  a
                                                                     q
                                                                         y
                                                                             S
                                                                                t
                                                                                   т
                                                                                       и
                                                                                          z
  n
                            a
                                q
                                     y
                                          S
                                                         u
                            0
  0
                                     \infty
                                \infty
                                          \infty
                                               \infty
                                                    \infty
                                                         \infty
                                                              \infty
                                    3
                                                         4
  1
        \{a\}
               а
                    \{u, y\}
                                                                         а
                                                                                       а
  2
                                9
                                                         4
       \{a, y\}
                   \{q, u, t\}
                                               6
               y
                                                                      y
                                                                                y
                                               6
  3
      \{a, u, y\}
                     \{t\}
               и
                                7
  4
                                                    11
      \{a, t, u,
                   \{q, m\}
               t
                                                                      t
                                                                                    t
        y}
  5
                                                   11
      \{a, q, t,
                     {s}
                                          12
                                                                             q
               q
       u, y
                                         12
                                                              18
  6
      \{a, m, q,
               т
                    \{s, z\}
                                                                                          т
      t, u, y
                                                             16
  7
      \{a, m, q,
               S
                     {z}
                                                                                           S
      s, t, u, y
```