Consider an undirected weighted graph $G = (V, E)$ with multiple start nodes $H \subseteq V$, where the weight function is $W$ (that is, $W(u, v)$ is the weight of the edge from node $u$ to $v$). Here we might think of the start nodes as hospitals and our goal is, for each node $u$, to find the shortest path between $u$ and some hospital $v \in H$ (it doesn’t matter which one, just use the closest one). Obviously, if $u \in H$, then that distance will be 0.

Modify Dijkstra’s algorithm to find the minimum distance to a hospital. Your algorithm should be the same as Dijkstra’s: $O((m + n) \log n)$ (so you should not be running Dijkstra’s multiple times).

Argue that your algorithm is correct.