Fundamental Algorithms, Section 003
Homework 10, Additional Problems, Fall 22.

1. Let $H = (X, F)$ be a dag. Suppose you are given a linear time algorithm to compute for each vertex x in a dag the sum of the weights of the vertices reachable from x (which includes vertex x).

Let $G = (V, E)$ be a directed graph. Suppose that each vertex v has a weight $W[v]$ stored in array $W[1 : n]$. Using the above algorithm as a subroutine, give a linear time algorithm to compute the sum of the weights of the vertices reachable from each vertex in G, storing the result in array ReachWt$[1 : n]$. You may quote standard procedures. Remember to justify your runtime.

2. Consider the single source low altitude path problem; the input consists of a directed graph $G = (V, E)$, and a source vertex $s \in V$. Now, each edge has a positive integer height. The height of a path is the maximum of the heights of the edges on the path. The task is to find the minimum height path from s to each vertex $v \in V$. Solve this problem by modifying Dijkstra's algorithm.
Hint. What changes is how you calculate the "length" of a path.