Algorithm HW11

1. Exercises 24.1-1

2. Exercise 24.1-5: *

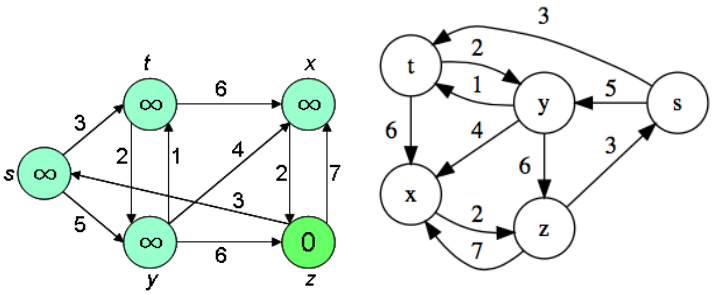
Let $G = (V, E)$ be a weighted, directed graph with weight function $\boldsymbol{w} : \boldsymbol{E} \rightarrow \mathbf{R}$. Give an $O(VE)$-time algorithm to find, for each vertex $v \in V$, the value $\delta^*(v) = \min_{u \in V}\{\delta(u, v)\}$

3. Exercise 24.1-6:

Suppose that a weighted, directed graph $G = (V, E)$ has a negative-weight cycle. Give an efficient algorithm to list the vertices of one such cycle. Prove that your algorithm is correct.

4. Exercises 24.3-1

Run Dijkstra's algorithm on the directed graph of Figure 24.2, first using vertex s as the source and then using vertex z as the source. In the style of Figure 24.6, show the d and π values and the vertices in set S after each iteration of the **while** loop.



5. Exercises 24.3-4

Professor Gaedel has written a program that he claims implements Dijkstra's algorithm. The program produces $v.d$ and $v.\pi$ for each vertex $v \in V$. Give an $O(V + E)$-time algorithm to check the output of the professor's program. It should determine whether the d and π attributes match those of some shortest-paths tree. You may assume that all edge weights are nonnegative.

6. Exercises 24.3-8

Let $G = (V,E)$ be a weighted, directed graph with nonnegative weight function $w : E \rightarrow \{0, 1, \ldots, W\}$ for some nonnegative integer W. Modify Dijkstra's algorithm to compute the shortest paths from a given source vertex s in $O(WV + E)$ time.

7. 課本 p.366 提到 ROD-CUT 問題，其中 BOTTOM-UP-CUT-ROD()的 pseudo code 是屬於 unit09_ppt 中 p.19、p.20 中的哪一項(Type I or Type II)?並且請將 BOTTOM-UP-CUT-ROD()的 pseudo code 改寫為另一種 Type。