Solution of Assignment 5

Problem 1 (15.4-1)

Determine an LCS of $\langle 1, 0, 0, 1, 0, 1, 0, 1 \rangle$ and $\langle 0, 1, 0, 1, 1, 0, 1, 1, 0 \rangle$.

Solution to Exercise 15.4-1

The LCS-LENGTH procedure finds the LCS $\langle 1, 0, 0, 1, 1, 0 \rangle$. The sequences $\langle 1, 0, 0, 1, 0, 1, 0, 1 \rangle$ and $\langle 0, 1, 0, 1, 1, 0, 1, 1, 0 \rangle$ have four other LCSs: $\langle 0, 1, 0, 1, 0, 1 \rangle$, $\langle 1, 0, 1, 0, 1, 0 \rangle$, $\langle 1, 0, 1, 0, 1, 1 \rangle$, and $\langle 1, 0, 1, 1, 0, 1 \rangle$.

Problem 2 (24.4.1)

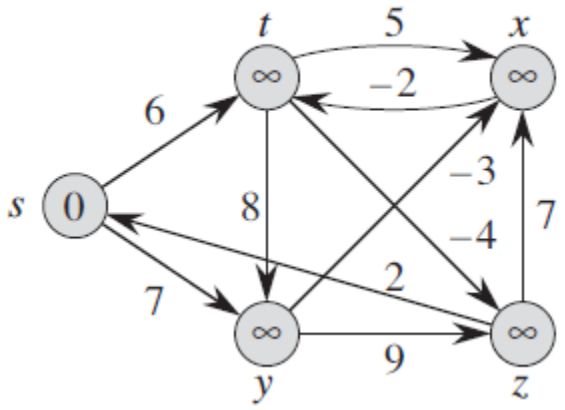
Find a feasible solution or determine that no feasible solution exists for the following system of difference constraints:

$$
\begin{aligned}
x_1 - x_2 &\le 1, \\
x_1 - x_4 &\le -4, \\
x_2 - x_3 &\le 2, \\
x_2 - x_5 &\le 7, \\
x_2 - x_6 &\le 5, \\
x_3 - x_6 &\le 10, \\
x_4 - x_2 &\le 2, \\
x_5 - x_1 &\le -1, \\
x_5 - x_4 &\le 3, \\
x_6 - x_3 &\le -8.
\end{aligned}
$$

Hint: please write the inequations as a matrix form, then apply linear program solver and check if there is a solution.

Problem 3 (24.1-1)

Run the Bellman-Ford algorithm on the directed graph of Figure 24.4, using vertex z as the source. In each pass, relax edges in the same order as in the figure, and show the d and π values after each pass. Now, change the weight of edge (z, x) to 4 and run the algorithm again, using s as the source.



Please refer to the steps from lecture.