Indian Institute of Technology, Kharagpur
Computer Science and Engineering Department

Autumn 2019-2020
Algorithms II (CS31005)

Note:
You are advised to use LaTeX for document preparation.

Tutorial Problem T2 [24-07-2019—30-07-2019]

$P[1..n]$ is an input list of n points on xy-plane. Assume that all n points have distinct x-coordinates and distinct y-coordinates. Let p_L and p_R denote the leftmost and the rightmost points of P, respectively. The task is to find the polygon Q with P as its vertex set such that the following conditions are satisfied.

i) The upper vertex chain of Q is x-monotone (increasing) from p_L to p_R.

ii) The lower vertex chain of Q is x-monotone (decreasing) from p_R to p_L.

iii) Perimeter of Q is minimum.

You have to answer the following. Provide necessary figures/diagrams for explanations.

1. Develop the recurrences needed for DP, with clear arguments.
2. Design the algorithm and write its main steps.
3. Derive the time and space complexities of your algorithm.

How to include figures in LaTeX

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\begin{figure}[!h]\center
  \includegraphics{poly1.pdf}
  \caption{Example of an $x$-monotone polygon.}
\label{fig:poly1}\end{figure}

An $x$-monotone polygon in shown in Fig. \ref{fig:poly1}.
```

Result in pdf file:

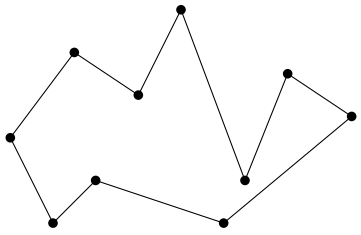

Figure 1: Example of an x-monotone polygon.

An x-monotone polygon in shown in Fig. 1.