

# CSE-619: Assignment-1

Full Marks: 20

Deadline: September 3, 2024

**Problem:** Consider the DEGREE-1-VERTEX DELETION problem as follows.

- **Input:** A simple undirected graph  $G = (V, E)$  and an integer  $k$ .
- **Parameter:**  $k$ .
- **Question:** Is there a set  $S \subseteq V(G)$  such that  $|S| \leq k$  and maximum degree of  $G - S$  is at most one?

There exists a polynomial-time algorithm that computes a set  $X \subseteq V(G)$  such that  $|X| \leq 3\text{OPT}(G)$  and the maximum degree of  $G - X$  is at most 1. Here  $\text{OPT}(G)$  denotes the minimum number of vertices required to delete so that the resulting graph has maximum degree one.

Use this algorithm above to design a kernel with  $15k$  vertices for DEGREE-1-VERTEX DELETION. It is okay even if your kernel has smaller number of vertices than  $15k$ .