# CSE-619: Quiz-1

Full Marks: 15

August 29, 2024

**Problem:** The $d$-BOUNDED DEGREE VERTEX DELETION problem is defined as follows.

- **Input:** An undirected graph $G = (V, E)$ and an integer $k$.
- **Parameter:** $k + d$.
- **Question:** Is there $S \subseteq V(G)$ of size at most $k$ such that deletion of $S$ reduces the maximum degree of $G - S$ to at most $d$?

Design a kernel with $O((k + d)^2)$ vertices for this problem.

**Important Instruction:** Precisely, write down every reduction rule and 1-2 lines explanation why that is safe. Finally, explain if those reduction rules are not applicable, why the input graph has size bounded by $O((k + d)^2)$ vertices.