CSE-619: Assignment-3

Full Marks: 40

Deadline: November 7, 2024

1. Consider the ONE-OVERLAP TRIANGLE PACKING problem that is defined as follows.

- **Input:** An undirected graph $G = (V, E)$ and an integer k.
- **Parameter:** k.
- **Question:** Are there k distinct triangles $C_1, \ldots, C_k$ in G such that for every $i \neq j$, $C_i \cap C_j$ has at most one common vertex?

Design a color-coding based FPT algorithm for ONE-OVERLAP TRIANGLE PACKING problem that runs in $2^{O(k)}poly(n)$-time. (**20 Marks**)

2. Let G be a graph together with a (nice) tree decomposition $\mathcal{T} = (T, \{X_t\}_{t \in V(T)})$ of width k. Recall the ODD CYCLE TRANSVERSAL problem that asks if G has at set S of at most ℓ vertices such that $G - S$ is bipartite.

Design an algorithm for ODD CYCLE TRANSVERSAL that runs in $3^k poly(n)$-time. (**20 Marks**)