

## Assignment 5

Due April 11, 2025

1. (8 marks) Give a 3-SAT boolean expression that is satisfiable iff the following SAT expression is satisfiable. Use the construction studied in class.

$$\Phi = (x \vee y \vee z \vee w \vee u \vee t) \wedge (\bar{x} \vee \bar{t})$$

2. (8 marks) Give a poly-reduction of HamCycle to MaxWeighted Cycle:

$\text{HamCycle} = \{ \langle G \rangle \mid G \text{ is an undirected graph that has a Hamilton cycle} \}$

$\text{MaxWeightedCycle} = \{ \langle G, w, K \rangle \mid G \text{ is an undirected graph, } w: E(G) \rightarrow \mathbb{R}^+ \cup \{0\}, K \geq 0, \text{ and } \exists \text{ a cycle in } G \text{ with weight } \geq K. \text{ (ie } \sum_{e \in \text{cycle}} w(e) \geq K). \}$