

CS 3800, Fall 2017  
Homework 10 (40 points)  
Assigned: Monday, 27 Nov 2017  
Due: Monday, 4 Dec 2017

1. [10 pts] Is the following formula satisfiable?

$$(x \vee y) \wedge (y \vee z) \wedge (\bar{x} \vee \bar{z}) \wedge (\bar{y} \vee z)$$

2. [10 pts] Prove: If  $P = NP$ , then *PATH* is NP-complete.
3. [10 pts] Let

$$A = \{\langle S, t \rangle \mid S \text{ is a set of integers, three of which add up to } t\}$$

Prove  $A \in P$ .

4. [10 pts] If  $G$  is an undirected graph, then a  $k$ -coloring of  $G$  uses at most  $k$  distinct colors to color every vertex of  $G$  with a color that's different from the colors of all neighboring vertices. Prove

$$KCOLOR = \{\langle G, k \rangle \mid \text{there exists a } k\text{-coloring of the graph } G\}$$

is in NP.