# CS170 — Fall 2017— Homework 5 Solutions

Jonathan Sun, SID 25020651

## 0. Who Did You Work With?

Collaborators: Kevin Vo, Aleem Zaki, Jeremy Ou

## 1. Scheduling Homeworks

(a)

(b)

(c)

## 2. Graph Coloring

(a) Following the hint, allow $p(G) : G \mapsto \mathbb{N}_0$ to denote the potential of a graph $G$. Let this potential be explicitly defined as the number of edges in $E$ that have the same color vertex on either end (same-color edges), which by definition always takes on a value $\in \mathbb{N}_0$. Each time that the loop runs, a vertex $v \in B$ is changed from one color to the other. $\forall v \in B$ there are $\geq 85$ vertices adjacent to $v$ and of the same color, and there are at most 85 vertices adjacent to $v$ of the opposite color. This shows that even with the maximal number of non-similar and minimal similar adjacent vertices there is still a decrease in the number of same-color edges by at least one (namely, one of the edges with $v$ as an end) when you switch the color of $v$. Thus, each iteration of the loop leads to a decrease of the value of $p(G)$ by at least one.

(b)

## 3. 170-Graph

**Main Idea:**
ok

**Run Time:**
ok

## 4. Weighted Set Cover

## 5. Quaternary Huffman

**Main Idea:**
ok

**Proof of Correctness:**
ok □

## 6. Simple and Naive Cluster Analysis