HOMEWORK 5, CPSC 421/501, FALL 2015

JOEL FRIEDMAN

1. Let TRIPLE-PARTITION be the language of sequences of positive integers $n_1, \dots, n_k$ such that they can be divded into three collections whose sums are equal, i.e., such that there are $A, B, C \subset \{1, \dots, k\}$ such that each element of $\{1, \dots, k\}$ is in exactly one of A, B, C and such that

$$\sum_{i \in A} n_i = \sum_{i \in B} n_i = \sum_{i \in C} n_i.$$

Show that TRIPLE-PARTITION is NP-complete.

2. Show that 3COLOR is NP-complete. For a reminder of what is 3COLOR and a hint, see the textbook's exercises, Chapter 7.

3. Let SQRT-CLIQUE be the set of graphs, G, such that G has n vertices for some perfect square n, and such that G has a clique of size $\sqrt{n}$. Show that SQRT-CLIQUE is NP-complete. [There is a related problem, HALF-CLIQUE, in the textbook's exercises, Chapter 7.]

Department of Computer Science, University of British Columbia, Vancouver, BC V6T 1Z4, Canada, and Department of Mathematics, University of British Columbia, Vancouver, BC V6T 1Z2, Canada.
  E-mail address: jf@cs.ubc.ca or jf@math.ubc.ca
  URL: http://www.math.ubc.ca/~jf