Homework Assignment 11
CS 535 Design and Analysis of Algorithms
Fall Semester, 2018

Due: 6pm, Thursday, November 8, 2018

Remember the Honesty Pledge!

1. (a) Label all the variables, operators, and clauses in Figure 10 in the Tipover article.
   (b) Draw a Tipover diagram for the 3-SAT expression \((\overline{a} \lor \overline{b} \lor \overline{c}) \land (b \lor c \lor d)\).

2. On page 4 of the graph coloring slides (regarding the colorability of the “or” gadget, it is claimed that the given crossover gadget can be used to prove that determining whether a planar graph is 3-colorable is an NP-complete problem. Use the following trellis gadget to prove that determining 3-coloring in a graph with maximum degree 4 is NP-complete.

3. 34.5-1 on page 1100 of CLRS3

4. PhD Qualifying Exam Section Problem 13.
   A “halftonian path” in a graph \(G\) is a path that goes through at least half of the vertices. Show that determining whether a given graph has a halftonian path is NP-hard.