CS/Math 240: Intro to Discrete Math 4/14/2011

Grading Key for Homework 8

Instructor: Dieter van Melkebeek

Problem 1 (7 points)

Problem 2 (8 points)

Problem 3 (12 points)

(a) Part a (6 points)

- 2pts for proving G1 and G3 are isomorphic
- 2pts for proving G1 and G4 are not isomorphic
- 1pt for concluding G1 and G4 are not isomorphic
- 1pt for proving G2 is not isomorphic to any other graph

(b) Part b (6 points)

- 2pts for proving G1 is not planar
- 2pts for proving G2 is not planar
- 1pt for proving G3 is not planar
- 1pt for proving G4 is not planar

Problem 4(8 points)

- 4 points for each subdivision

Problem 5 (5 points)

Common Mistakes

- On the first problem, while trying to prove that if the graph contains no odd length cycles then it is a bipartite graph, a number of students defined the partitions L and R by the parity of the shortest path to an arbitrary vertex. This argument is fine, but it assumes that the graph is connected, which needs to be mentioned explicitly. Also as always, you need to prove both directions of the iff statement.
- On problem 3, some have incorrectly counted faces by considering a face as a region caused by intersecting edges seperately and said the graphs were not planar since $\mid V \mid - \mid E \mid + \mid F \mid \neq 2$.
- On problem 4b, some students correctly noted that it was possible to remove the 5-degree vertex v, color G', and then re-add v. However, this should be framed as an inductive proof which should include arguments to prove that G' was in fact 6-colorable.
- On problem 5, just giving the number of handshakes would not suffice. You also need to argue as to how you arrived at the solution.