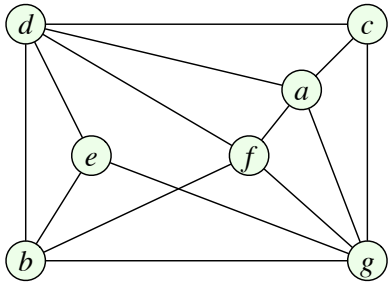
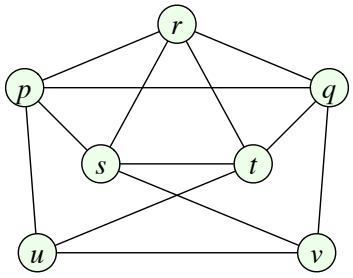
CS111 ASSIGNMENT 5

Problem 1: Determine whether the two graphs below are planar or not. To show planarity, give a planar embedding. To show that a graph is not planar, use Kuratowski's theorem.

Graph H:



Graph G:



Problem 2: (a) For each degree sequence below, determine whether there is a graph with 6 vertices where vertices have these degrees. If a graph exists, (i) draw it, (ii) find the chromatic number and justify. If it doesn't, justify that it doesn't exist.
Note. To give a justification for the chromatic number, you need to give a coloring and explain why it's not possible to use fewer colors.

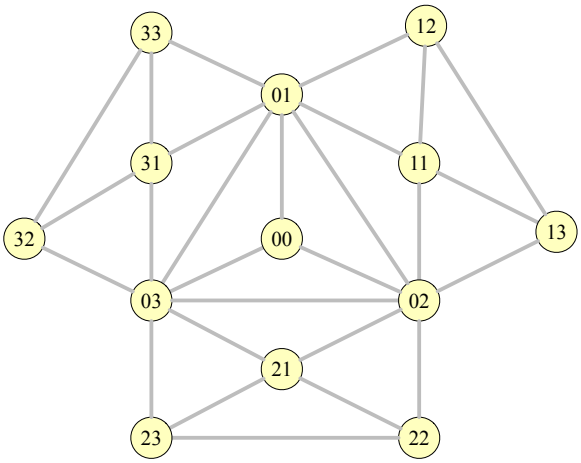
(a1) $5, 4, 4, 3, 3, 1$.
(a2) $5, 4, 3, 2, 2, 1$.
(a3) $4, 4, 4, 3, 3, 2$.

(b) For each degree sequence below, determine whether there is a planar graph with 6 vertices where vertices have these degrees. If a graph exists, (i) draw it, (ii) find the chromatic number and justify. If it doesn't, justify that it doesn't exist.

(b1) $5, 5, 4, 4, 4, 2$.
(b2) $3, 3, 3, 3, 3, 3$.

Problem 3:

a) Does the graph shown below have an Euler tour? Give a complete justification for your answer.
b) Does the graph shown below have a Hamiltonian cycle? Give a complete justification for your answer.



Academic integrity declaration. The homework papers must include at the end an academic integrity declaration. This should be a short paragraph where you briefly explain *in your own words* (1) whether you did the homework individually or in collaboration with a partner student (if so, provide the name), and (2) whether you used any external help or resources.

Submission. To submit the homework, you need to upload the pdf file to Gradescope. If you submit with a partner, you need to put two names on the assignment and submit it as a group assignment. Remember that only LaTeX papers are accepted.