DUE: 10am THURSDAY Mar 28 in the drop boxes opposite the Math Tutorial Centre MC 4067.

1. For each of the graphs shown, determine whether it is planar. If the graph is planar, exhibit a planar embedding. If the graph is not planar, exhibit a subdivision of K_5 or $K_{3,3}$.
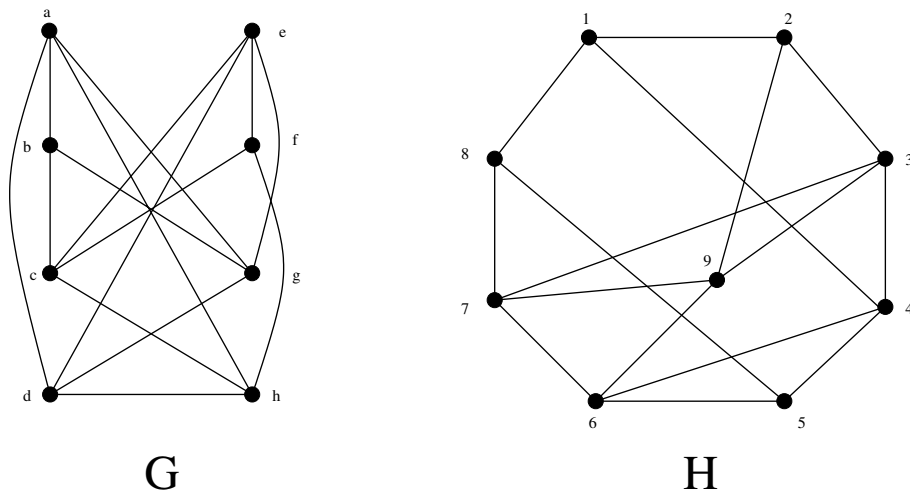

Figure 1:

2. For each of the graphs shown, determine whether it is planar. If the graph is planar, exhibit a planar embedding. If the graph is not planar, exhibit a subdivision of K_5 or $K_{3,3}$.
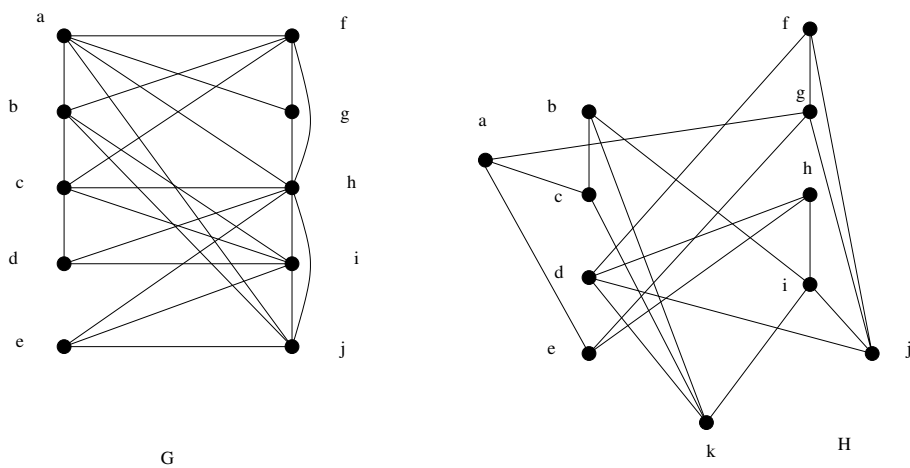

Figure 2:

3. Let G be a bipartite graph with at least 9 vertices. Prove that the complement $\bar{G}$ of G is not planar.

4. Let G be a planar graph that does not contain any cycles of length 3.

   (a) Prove that G contains a vertex of degree at most 3.

   (b) Prove that G is 4-colourable. (Do not use the Four-Colour Theorem.)

5. Let G' be a subdivision of a bipartite graph G. Prove that G' is 3-colourable.