MA010 Graph Theory—Homework Set #2

Each problem is worth 3 points. The solutions should be submitted using the university information system by **November 11**. Please submit your solutions as pdf files produced by a suitable text editor, e.g., LaTeX; solutions that are not submitted as pdf files may be assigned no points. Your solution should contain references to all sources, including those available on the web, that you have used.

1. Show that every quadrangulation of the plane is 2-colorable (recall that a quadrangulation is a plane graph such that each face is bounded by a cycle of length four).

2. Show that for every positive integer n, there exists a positive integer N such that every 2-edge-coloring of $K_{N,N}$ contains a monochromatic copy of $K_{n,n}$.

3. Show that every n-vertex chordal graph G has at most $n(\omega(G)-1)-\binom{\omega(G)}{2}$ edges.

4. Show that every connected chordal graph with $n \geq 2$ vertices has at most $n-1$ cliques (recall that a clique is a *maximal* complete subgraph).