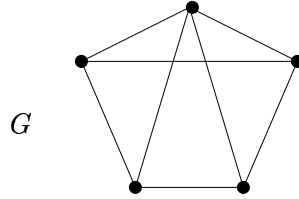


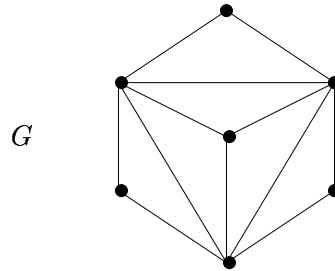
# MATH2300

## Graph Theory Problem Sheet 5

1. Determine  $\beta(G)$ ,  $\omega(G)$ ,  $\sigma(G)$ ,  $\chi(G)$  and  $\chi'(G)$  for the graph  $G$  shown below.



2. Determine  $\beta(G)$ ,  $\omega(G)$ ,  $\sigma(G)$ ,  $\chi(G)$  and  $\chi'(G)$  for the graph  $G$  shown below.



3. Draw two bridgeless 3-regular graphs of order 10; one with edge chromatic number 3, and the other with edge chromatic number 4.
4. Prove that  $\chi(K_p) = p$  for all odd  $p$ .
5. Show that if  $G$  is a graph with  $p$  vertices then  $\chi(G) \leq p + 1 - \beta(G)$ .
6. Determine  $\chi'(Q_n)$  for all  $n \geq 1$ . Justify your answer.
7. If  $\chi(G) \leq 4$ , must  $G$  be planar?
8. Show that, for every integer  $p \geq 4$ , there exists a planar graph of order  $p$  such that  $\chi(G) = 4$ .

End of Problem Sheet 5