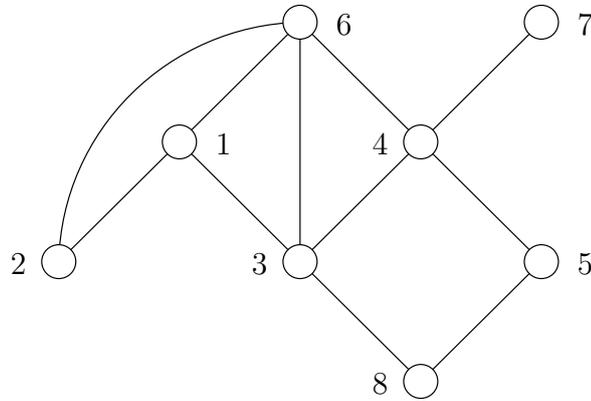## 2 Artificial Intelligence I (SBH)

We wish to solve the following graph colouring problem by treating it as a *constraint satisfaction problem*.

The nodes of the graph must be coloured either red (R), blue (B) or green (G) with no pair of connected nodes having the same colour.

(*a*) Describe *Gaschnig's algorithm*. In what way does it improve on *chronological backtracking*? [6 marks]

(*b*) The following sequence of assignments has been made: 1 = R, 2 = G, 3 = B, 4 = G, 5 = B. Explain how Gaschnig's algorithm operates when trying to make an assignment to 6. [3 marks]

(*c*) Describe how *graph-based backjumping* would behave in the situation described in part (*b*). Does it backjump to the same place? Why might graph-based backjumping in general be preferred to Gaschnig's algorithm? [6 marks]

(*d*) Describe how *forward checking* would deal with the sequence of assignments given in part (*b*). How does the effectiveness of backjumping compare with that of forward checking in this case? [5 marks]