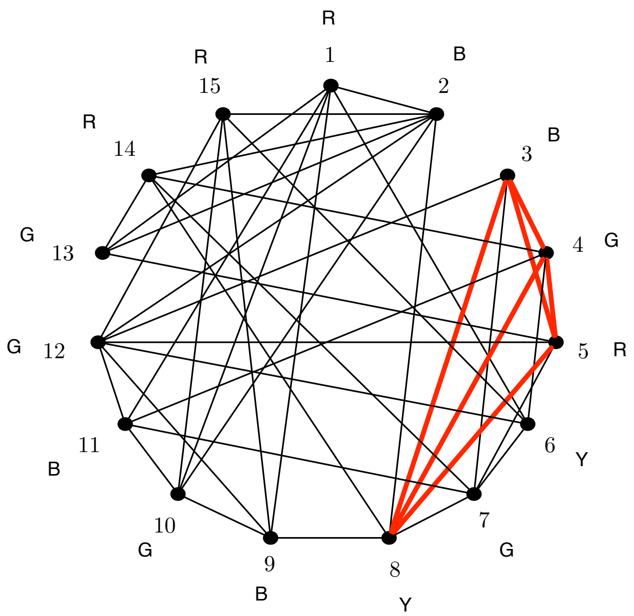
▶ **Problem 13.2-23** The local day care center has a problem because certain children do not get along with certain others. The table shows which of 15 children don't get along with whom. Finally, it is decided that children who do not get along with each other will have to be put into separate rooms. Find the minimum number of rooms required.

Child	Doesn't get along with
1	2, 6, 9, 10, 11, 13
2	1, 8, 10, 12, 13, 14, 15
3	4, 5, 7, 8, 12
4	3, 5, 6, 8, 11, 14
5	3, 4, 7, 8, 12, 13
6	1, 4, 7, 12, 15
7	3, 5, 6, 8, 11, 14
8	2, 3, 4, 5, 7, 9, 14
9	1, 8, 10, 12, 15
10	1, 2, 9, 11, 15
11	1, 4, 7, 10, 12
12	2, 3, 5, 6, 9, 11, 15
13	1, 2, 5, 14
14	2, 4, 7, 8, 13
15	2, 6, 9, 10, 12

Solution. Two children must be put in different rooms if one fights with the other. We make graph G whose vertices represent the 15 children. Two vertices are joined by an edge if the corresponding children fight. The graph contains K_4 (consider vertices 3,4,5 and 8) so at least four colors are required. We show a 4-coloring, so we conclude that $\chi(G) = 4$. The center can get away with four rooms.



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