1. Determine the chromatic number of the two graphs below.

\[ \text{Graph 1} \quad \text{Graph 2} \]

2. Determine the chromatic number of the following graph: Given a finite set of lines in \( \mathbb{R}^2 \) with no 2 parallel and no 3 concurrent, let the vertices be the intersection points of the lines, and connect two intersection points if they are consecutive on one of the lines.

3. Prove that if every two odd cycles of \( G \) intersect in at least one vertex, then \( \chi(G) \leq 5 \).

4. Determine the edge-chromatic numbers of the complete graphs \( K_n \).

5. Prove that if \( G \) is bipartite, then \( \chi_e(G) = \Delta(G) \).

*6. Find the smallest 3-regular graph that contains no \( C_3 \) or \( C_4 \), and prove that it is the only graph of that size with those properties.

*7. Show that a connected graph with \( 2k \) edges can be decomposed into \( k \) paths of length two.

*8. Show that any graph \( G \) with \( |V(G)| \geq 4 \) and \( |E(G)| \geq 2|V(G)| - 3 \) contains two cycles of the same length.

*9. Prove that a graph \( G \) with \( |E(G)| \geq |V(G)| + 4 \) contains two edge-disjoint cycles.

*10. Let \( G \) be a graph with the property that any subgraph \( H \) has \( |E(H)| \leq 2|V(H)| - 2 \). Prove that \( G \) can be decomposed into two forests. More precisely, show that \( G \) contains forests \( F_1, F_2 \) with \( E(F_1) \cap E(F_2) = \emptyset \) and \( E(F_1) \cup E(F_2) = E(G) \).