IC250 Lab 7

This assignment has two compulsory questions and two optional questions.

1. **Testing if a grpah is bipartite.** Given an undirected, unweighted graph, using BFS, determine if it is bipartite. Give a valid 2-coloring for this graph, if it exists.
2. **Directed graph.** You are asked to arrange n ill-behaved children in a line. You are given statements like "i hates j". If i hates j, then you must not put i somewhere behind j, since i may throw something at j. Model this as a graph problem and find an order for the line, else say it is not possible.
3. **Optional.** Given a directed graph, determine the set of strongly connected components.
4. **Optional.** Given a directed graph, determine all the vertices reachable from a particular vertex.
5. **Optional.** The square of a directed graph $G(V, E)$ is the graph $G^2 = (V, E^2)$, such that $(u, w) \in E^2$ if and only if there exists a vertex $v \in V$ such that $(u, v) \in E$ and $(v, w) \in E$. In other words, there is a path of exactly two edges from u to w in G. Given a directed graph, compute its square.