Solution to Homework 28

**Problem.** On the example of the formula \((\neg a \lor b \lor \neg c) \& (a \lor \neg b)\), show how checking its satisfiability can be reduced to an instance of the clique problem.

**Solution.** According to the general algorithm, since we have 2 clauses, we will be looking for cliques of size 2, i.e., edges.

To construct the corresponding graph, we do the following. First, we place two groups of vertices:

- vertices \(\neg a_1\), \(b_1\), and \(\neg c_1\) corresponding to the first clause; and
- vertices \(a_2\) and \(\neg b_2\) corresponding to the second clause.

The following pairs of vertices are connected by edges:

- the vertex \(\neg a_1\) is connected to \(\neg b_2\) (but not to \(a_2\));
- the vertex \(b_1\) is connected to \(a_2\) (but not to \(\neg b_2\)); and
- the vertex \(\neg c_1\) is connected to \(a_2\) and to \(\neg b_2\).

These edges are the desired cliques of size 2.