Example: 2 Give deduction trees of resolution for \([a]\) using (1) and (2) for the following the set of clauses and show each level of unification with instantiation.

(1) \(\text{professor}(X, Y) \lor \neg\text{teaches}(X, C) \lor \neg\text{studies}(Y, C)\)
(2) \(\text{studies}(\text{charlie, csc135})\)
(3) \(\neg\text{teaches}(\text{collins, csc135})\)
(4) \(\text{teaches}(\text{kirke, csc135})\)
(5) \(\neg\text{professor}(\text{kirke, charlie})\)

Answer:

\([a]\) using (1) and (2)

\begin{align*}
(1) & \text{professor}(X, Y) \lor \neg\text{teaches}(X, C) \lor \neg\text{studies}(Y, C) \\
(2) & \text{studies}(\text{charlie, csc135}) \\
(3) & \neg\text{teaches}(\text{collins, csc135}) \\
(4) & \text{teaches}(\text{kirke, csc135}) \\
(5) & \neg\text{professor}(\text{kirke, charlie}) \\
\end{align*}

Resolving (1) \(\text{professor}(X, Y) \lor \neg\text{teaches}(X, C) \lor \neg\text{studies}(Y, C)\) and
(2) \(\text{studies}(\text{charlie, csc135})\), we can cancel out two unified and conflicting terms \(\neg\text{studies}(Y, C)\) and \(\text{studies}(\text{charlie, csc135})\) with instantiating variable \(Y\) to \(\text{charlie}\) and variable \(C\) to \(\text{csc135}\). And in next step when we have new clause we need to change the
instantiate value accordingly. Then we need to take clause (4) teaches (kirke, csc135) since we can unify it with \( \neg \text{teaches}(X, \text{csc135}) \) and variable \( X \) **gets instantiated to kirke**. Again in next step we need to change value of \( X \) in new clause and take clause (5) \( \neg \text{professor}(\text{kirke}, \text{charlie}) \) that finally leads to contradiction.