(These lecture notes are **not** proofread and proof-checked by the instructor.)

Genral Notes:

- Assignment 2 due Feb 8 (tomorrow)

- Assignment 3 posted Feb 7 (today)

- Be prepared to give a progress report (verbal of your project) before semester break

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1. In a tableau, both paths are closed (marked by X), because each includes a propositional variable and its negation (p along the left path, q along the right path). We conclude that Γ is unsatisfiable. (9/Handout 9)

2. Heuristic(s): any approach to problem solving, learning, or discovery that employs a practical method not guaranteed to be optimal or perfect, but sufficient for the immediate goals. Where finding an optimal solution is impossible or impractical, heuristic methods can be used to speed up the process of finding a satisfactory solution. Heuristics can be mental shortcuts that ease the cognitive load of making a decision. Examples of this method include using a rule of thumb, an educated guess, an intuitive judgment, stereotyping, profiling, or common sense.

   A rule of thumb is a principle with broad application that is not intended to be strictly accurate or reliable for every situation. It is an easily learned and easily applied procedure for approximately calculating or recalling some value, or for making some determination. It is based not on theory but on practical experience. Compare this to heuristic, a similar concept used in mathematical discourse, psychology, and computer science, particularly in algorithm design.

3. Horn formula

   Prolog SQL

   Query Language

4. Theorem (Refutation Completeness of Tableaux): For a finite set Γ of propositional WFF?s, if $\Gamma \models \bot$, then there is a closed tableau for Γ.

   Theorem (Soundness of Tableaux): For a finite set Γ of propositional WFF?s, if there is a closed tableau for Γ, then $\Gamma \models \bot$. (17/Handout 9)

   *We do not say completeness of tableaux, but refutation completeness of tableaux.

   *Refutation completeness is not a fundamental limitation.

   $\Gamma \models \psi \iff \Gamma \cup \{\neg\psi\}$ is unsatisfiable $\iff (\wedge\Gamma) \wedge \neg\psi$ is a contradiction.

5. Theorem

   For a finite set Γ of propositional WFF's, Γ is satisfiable if there is a maximal tableau for Γ with an open path. (19/Handout 9)

6. Tableau method will not always win. See the exercises and their conclusion on page 22(Handout 9).

7. Resolution refutation-based method

8. Conjunctive normal form and Disjunctive normal form (4/Handout 10)