Lecture-16 Main Points

- Labeling Proof rules with constructions.

$\exists \mathbf{i} \quad \dfrac{\Gamma \vdash a : \phi[t/x]}{\Gamma \vdash \langle t, a \rangle : \exists x.\phi}$

$\exists \mathbf{e} \quad \dfrac{\Gamma \vdash a : \exists x.\phi \qquad \Gamma', v : \phi[y/x] \vdash c : \psi}{\Gamma, \Gamma' \vdash \text{let } a = \langle d, e \rangle \text{ in } c[d/y, e/v] : \psi} \qquad y \notin FV(\Gamma', \psi, \exists x.\phi)$

$\forall \mathbf{i} \quad \dfrac{\Gamma \vdash a : \phi[y/x]}{\Gamma \vdash \lambda y.a : \forall x.\phi} \qquad y \notin FV(\Gamma, \forall x.\phi)$

$\forall \mathbf{e} \quad \dfrac{\Gamma \vdash a : \forall x.\phi}{\Gamma \vdash at : \phi[t/x]}$

- Intuitive justification of labeling.

- Examples of labeled deductions.

- Non-Classical logics

  - Minimal and Intuitionistic logics are examples of Non-classical logics but still designed to capture reasoning in mathematics.

  - Instead we are interested in reasoning about everyday situations and without restricting use of a Natural Language.

- Some issues

  - Material implication $(A \rightarrow B \Leftrightarrow \neg A \vee B)$ does not capture conditional in English language.

  - Para consistent reasoning

  - What meaning to assign to paradoxical sentences.