CSE 311: Foundations of Computing I

Axioms & Inference Rules

Excluded Middle

$$\therefore \quad A \vee \neg A$$

Direct Proof

$$\frac{A \Rightarrow B}{\therefore \quad A \to B}$$

Modus Ponens

$$\frac{A \qquad A \to B}{\therefore \qquad B}$$

Intro $\wedge$

$$\frac{A \qquad B}{\therefore \quad A \wedge B}$$

Elim $\wedge$

$$\frac{A \wedge B}{\therefore \; A \qquad B}$$

Intro $\vee$

$$\frac{A}{\therefore \; A \vee B \quad B \vee A}$$

Elim $\vee$

$$\frac{A \vee B \qquad \neg A}{\therefore \qquad B}$$

Intro $\exists$

$$\frac{P(c) \text{ for some } c}{\therefore \qquad \exists x \; P(x)}$$

Elim $\forall$

$$\frac{\forall x \; P(x)}{\therefore \; P(a) \text{ for any } a}$$

Intro $\forall$

$$\frac{\text{Let } a \text{ be arbitrary} \ldots P(a)}{\therefore \; \forall x \; P(x) \qquad (\text{If no other name in } P \text{ depends on } a)}$$

Elim $\exists$

$$\frac{\exists x \; P(x)}{\therefore \; P(c) \text{ for some } \textit{special } c \qquad \text{list dependencies for } c}$$