

## Natural Deduction (Propositional Logic)

### Constructive Rules

$$\begin{array}{c}
 \frac{A \quad B}{A \wedge B} \wedge i \qquad \frac{A \wedge B}{A} \wedge e1 \qquad \frac{A \wedge B}{B} \wedge e2 \\
 \\
 \frac{A}{A \vee B} \vee i1 \qquad \frac{B}{A \vee B} \vee i2 \qquad \frac{A \vee B \quad \boxed{\begin{array}{c} A \\ \vdots \\ C \end{array}} \quad \boxed{\begin{array}{c} B \\ \vdots \\ C \end{array}}}{C} \vee e \\
 \\
 \frac{\boxed{\begin{array}{c} A \\ \vdots \\ B \end{array}}}{A \rightarrow B} \rightarrow i \qquad \frac{A \rightarrow B \quad A}{B} \rightarrow e \text{ (MP)} \\
 \\
 \frac{\boxed{\begin{array}{c} A \\ \vdots \\ \perp \end{array}}}{\neg A} \neg i \qquad \frac{\neg A \quad A}{\perp} \neg e \qquad \frac{}{\top} \top i \qquad \frac{\perp}{A} \perp e
 \end{array}$$

### Classical Rules (Pick any one, and the others are provable)

$$\frac{\neg\neg A}{A} \neg\neg e \qquad \frac{\boxed{\begin{array}{c} \neg A \\ \vdots \\ \perp \end{array}}}{A} \text{PBC} \qquad \frac{}{A \vee \neg A} \text{LEM}$$