Fitch-style Rules for First-Order Logic

_

1.1 Universal Elimination ($\forall E$)

$$\begin{array}{c|cccc}
1 & \forall x \, Px \\
2 & \text{Pa} & \forall \text{E, 1}
\end{array}$$

$$\begin{array}{c|c} 1 & \forall x (P(x) \land Q(x)) \\ \hline 2 & P(c) \land Q(c) & \forall E, 1 \end{array}$$

1.2 Existential Introduction $(\exists I)$

$$\begin{array}{c|cc}
1 & Pa \\
2 & \exists x Px & \exists I, 1
\end{array}$$

$$\begin{array}{|c|c|c|c|}\hline 1 & P(c) \land Q(c) \\\hline 2 & \exists x (P(x) \land Q(c)) & \exists I, 1 \\\hline \end{array}$$

1.3 Universal Introduction $(\forall I)$

```
\begin{array}{c|cccc}
1 & Pa \\
2 & \vdots \\
3 & Qa \\
4 & \forall x Qx & \forall I, 1-3
\end{array}
```

1.4 Existential Elimination (∃E)

1.5 Identity Introduction (=I)

$$1 \mid a = a = I$$

1.6 Identity Elimination (=E)

$$\begin{array}{c|cccc}
1 & a = b \\
2 & Pa \\
3 & Pb & =E, 1, 2
\end{array}$$