Summary of Rules

Propositional rules ($\mathcal{F}_T$)

Conjunction Introduction
($\land$ Intro)

$$
\begin{array}{r|l}
 & P_1 \\
 & \Downarrow \\
 & P_n \\
 & \vdots \\
\triangleright & P_1 \land \ldots \land P_n
\end{array}
$$

Conjunction Elimination
($\land$ Elim)

$$
\begin{array}{r|l}
 & P_1 \land \ldots \land P_i \land \ldots \land P_n \\
 & \vdots \\
\triangleright & P_i
\end{array}
$$

Disjunction Introduction
($\lor$ Intro)

$$
\begin{array}{r|l}
 & P_i \\
 & \vdots \\
\triangleright & P_1 \lor \ldots \lor P_i \lor \ldots \lor P_n
\end{array}
$$

Disjunction Elimination
($\lor$ Elim)

$$
\begin{array}{r|l}
 & P_1 \lor \ldots \lor P_n \\
 & \vdots \\
 & \quad \begin{array}{|l} P_1 \\ \hline \vdots \\ S \end{array} \\
 & \quad \Downarrow \\
 & \quad \begin{array}{|l} P_n \\ \hline \vdots \\ S \end{array} \\
 & \vdots \\
\triangleright & S
\end{array}
$$

Negation Introduction
($\neg$ Intro)

	P (subproof assumption)
	⋮
	$\bot$
▷	$\neg P$

Negation Elimination
($\neg$ Elim)

	$\neg\neg P$
	⋮
▷	P

$\bot$ Introduction
($\bot$ Intro)

	P
	⋮
	$\neg P$
	⋮
▷	$\bot$

$\bot$ Elimination
($\bot$ Elim)

	$\bot$
	⋮
▷	P

Conditional Introduction
($\rightarrow$ Intro)

	P (subproof assumption)
	⋮
	Q
▷	$P \rightarrow Q$

Conditional Elimination
($\rightarrow$ Elim)

	$P \rightarrow Q$
	⋮
	P
	⋮
▷	Q

Biconditional Introduction
(↔ Intro)

| P
| ⋮
| Q

| Q
| ⋮
| P

▷ P ↔ Q

Biconditional Elimination
(↔ Elim)

P ↔ Q (or Q ↔ P)
⋮
P
⋮
▷ Q

Reiteration
(Reit)

P
⋮
▷ P

First-order rules ($\mathcal{F}$)

Identity Introduction
(= Intro)

▷ n = n

Identity Elimination
(= Elim)

P(n)
⋮
n = m
⋮
▷ P(m)

General Conditional Proof (∀ Intro)

$\boxed{c}$ P(c)
⋮
Q(c)
▷ ∀x (P(x) → Q(x))

Universal Elimination (∀ Elim)

∀x S(x)
⋮
▷ S(c)

Universal Introduction (∀ Intro)

$\boxed{c}$
⋮
P(c)
▷ ∀x P(x)

where c does not occur outside the subproof where it is introduced.

Existential Introduction (∃ Intro)

S(c)
⋮
▷ ∃x S(x)

Existential Elimination (∃ Elim)

∃x S(x)
⋮
$\boxed{c}$ S(c)
⋮
Q
▷ Q

where c does not occur outside the subproof where it is introduced.

Induction rules

Peano Induction:

$$
\begin{array}{l|l}
 & P(0) \\
 & \quad \boxed{n}\ P(n) \\
 & \quad \vdots \\
 & \quad P(s(n)) \\
\triangleright & \forall x\, P(x)
\end{array}
$$

Where n does not occur outside the subproof where it is introduced.

Strong Induction:

$$
\begin{array}{l|l}
 & \quad \boxed{n}\ \forall x\,(x < n \to P(x)) \\
 & \quad \vdots \\
 & \quad P(n) \\
\triangleright & \forall x\, P(x)
\end{array}
$$

Where n does not occur outside the subproof where it is introduced.

Inference Procedures (Con Rules)

Fitch also contains three, increasingly powerful inference procedures. They are not technically inference rules.

Tautological Consequence (Taut Con)

Taut Con allows you to infer any sentence that follows from the cited sentences in virtue of the meanings of the truth-functional connectives alone.

First-order Consequence (FO Con)

FO Con allows you to infer any sentence that follows from the cited sentences in virtue of the meanings of the truth-functional connectives, the quantifiers and the identity predicate.

Analytic Consequence (Ana Con)

In theory, **Ana Con** should allow you to infer any sentence that follows from the cited sentences in virtue of the meanings of the truth-functional connectives, the quantifiers, the identity predicate and the blocks language predicates. The Fitch implementation of **Ana Con**, however, does not take into account the meaning of Adjoins or Between due to the complexity these predicates give rise to.