Inference rules in natural deduction.

	Name	*rule*	`coq` forward	`coq` backward
1	$\land I$	$\dfrac{\begin{array}{c} H1 : A \\ H2 : B \end{array}}{A \land B}$	`pose proof(conj H1 H2).`	`split.`
2	$\land E_1$	$\dfrac{H1 : A \land B}{A}$	`pose proof(proj1 H1).`	–
3	$\land E_2$	$\dfrac{H1 : A \land B}{B}$	`pose proof(proj2 H1).`	–
4	$\lor I_1$	$\dfrac{H1 : C}{C \lor X}$	`pose proof(or_introl (B:=X) H1).` or `pose proof(@or_introl _ X H1).`	`left.`
5	$\lor I_2$	$\dfrac{H1 : C}{X \lor C}$	`pose proof(or_intror (A:=X) H1).` or `pose proof(@or_intror X _ H1).`	`right.`

6	$\lor E$	$\dfrac{\begin{array}{c} H1 : A \lor B \\ H2 : A \Rightarrow C \\ H3 : B \Rightarrow C \end{array}}{C}$	`pose proof(or_ind H2 H3 H1).`
			or
			`destruct H1.`
			($H2$ and $H3$ are not needed)
				–

7	$\Rightarrow I$	assumption/discharge	`assert(A->B).  intros Hn.`	`intros Hn.`
8	$\Rightarrow E$	$\dfrac{\begin{array}{c} H1 : A \Rightarrow B \\ H2 : A \end{array}}{B}$	`pose proof(H1 H2).`	`apply H1.`
9	$\neg I$	$\dfrac{H1 : A \Rightarrow \bot}{\neg A}$	`pose proof (H1:~A).`	–
10	$\neg E$	$\dfrac{H1 : \neg A}{A \Rightarrow \bot}$	`unfold not in *.`	`unfold not.`
11	$\Leftrightarrow I$	$\dfrac{\begin{array}{c} H1 : A \Rightarrow B \\ H2 : B \Rightarrow A \end{array}}{A \Leftrightarrow B}$	`pose proof(conj H1 H2:A<->B).`	`split.`
12	$\Leftrightarrow E$	$\dfrac{\begin{array}{c} H1 : A \Leftrightarrow B \\ H2 : (\ldots A \ldots) \end{array}}{(\ldots B \ldots)}$	`rewrite H1 in H2.` or `rewrite <- H1 in H2.`	`rewrite H1.` or `rewrite <- H1.`
13	$\bot E$	$\dfrac{H1 : \bot}{X}$	`destruct H1.`	`exfalso.`
14	$\top I$	$\dfrac{}{\top}$	`pose proof(I).`	–
15	$\forall I$	assumption/discharge	–	`intros c`
16	$\forall E$	$\dfrac{\begin{array}{c} H1 : \forall x, Px \\ c \text{ is a constant} \end{array}}{Pc}$	`pose proof(H1 c).`	–
17	$\exists I$	$\dfrac{\begin{array}{c} c \text{ is a constant} \\ H1 : Pc \end{array}}{\exists x, Px}$	`pose proof(ex_intro P c H1).`	`exists c.`
18	$\exists E$	$\begin{array}{c} H1 : \exists x, Px \\ \hline c \text{ is a constant (fresh)} \\ Pc \end{array}$	`destruct H1.`	–
19	$=I$	$\dfrac{c \text{ is a constant}}{c = c}$	`pose proof(eq_refl c).`	`reflexivity`
20	$=E$	$\dfrac{\begin{array}{c} c \text{ is a constant} \\ d \text{ is a constant} \\ H1 : c = d \\ H2 : Pc \end{array}}{Pd}$	`rewrite H1 in H2.` or `rewrite <- H1 in H2.`	`rewrite H1.` or `rewrite <- H1.`
21	LEM	$\dfrac{}{X \lor \neg X}$	`pose proof (classic X).`	–