Reference Page for Predicate Calculus

Axioms:

A1 $[((X \equiv Y) \equiv Z) \equiv (X \equiv (Y \equiv Z))]$

A2 $[X \equiv Y \equiv Y \equiv X]$

A3 $[Y \equiv Y \equiv \mathbf{true}]$

A4 $[X \vee (Y \vee Z) \equiv (X \vee Y) \vee Z]$

A5 $[X \vee Y \equiv Y \vee X]$

A6 $[X \vee X \equiv X]$

A7 $[X \vee (Y \equiv Z) \equiv X \vee Y \equiv X \vee Z]$

A8 $[X \vee Y \equiv X \equiv Y \equiv X \wedge Y]$

A9 $[X \vee Y \equiv Y \equiv X \Rightarrow Y]$

A10 $[\neg X \vee X]$

A11 $[\neg(X \equiv Y) \equiv X \equiv \neg Y]$

Theorems:

T1 $[X \vee \mathbf{true} \equiv \mathbf{true}]$

T2 $[X \wedge \mathbf{true} \equiv X]$

T2 $[X \wedge X \equiv X]$

T3 $[X \wedge (Y \wedge Z) \equiv (X \wedge Y) \wedge Z]$

T4 $[\neg\neg X \equiv X]$

T5 $[X \Rightarrow Y \equiv \neg X \vee Y]$

Reference Page for Temporal Logic

Axioms:

$(P \ \textbf{next} \ Q).G \ \equiv \ (\forall a : a \in G : \{P\} \quad a \quad \{Q\})$

$\textbf{stable}.P \ \equiv \ P \ \textbf{next} \ P$

$\textbf{invariant}.P \ \equiv \ \textbf{initially}.P \wedge \textbf{stable}.P$

$P \ \textbf{unless} \ Q \ \equiv \ (P \wedge \neg Q) \ \textbf{next} \ (P \vee Q)$

$(\textbf{transient}.P).G \ \equiv \ (\exists a : a \in G : \{P\} \quad a \quad \{\neg P\})$

$P \ \textbf{ensures} \ Q \ \equiv \ (P \wedge \neg Q) \ \textbf{next} \ (P \vee Q) \wedge \textbf{transient}.(P \wedge \neg Q)$

$P \ \textbf{ensures} \ Q \ \Rightarrow \ P \rightsquigarrow Q$

$(P \rightsquigarrow Q) \wedge (Q \rightsquigarrow R) \ \Rightarrow \ P \rightsquigarrow R$

$(\forall i :: P_i \rightsquigarrow Q) \ \Rightarrow \ (\exists i :: P_i) \rightsquigarrow Q$

Theorems:

$(P_1 \ \textbf{next} \ Q_1) \wedge (P_2 \ \textbf{next} \ Q_2) \ \Rightarrow \ (P_1 \wedge P_2) \ \textbf{next} \ (Q_1 \wedge Q_2)$

$(P_1 \ \textbf{next} \ Q_1) \wedge (P_2 \ \textbf{next} \ Q_2) \ \Rightarrow \ (P_1 \vee P_2) \ \textbf{next} \ (Q_1 \vee Q_2)$

$(P \ \textbf{next} \ Q) \wedge [Q \ \Rightarrow \ Q'] \ \Rightarrow \ (P \ \textbf{next} \ Q')$

$(P \ \textbf{next} \ Q) \wedge [P' \ \Rightarrow \ P] \ \Rightarrow \ (P' \ \textbf{next} \ Q)$

$\textbf{stable}.P \wedge \textbf{stable}.Q \ \Rightarrow \ \textbf{stable}.(P \wedge Q)$

$\textbf{stable}.P \wedge \textbf{stable}.Q \ \Rightarrow \ \textbf{stable}.(P \vee Q)$

$P \rightsquigarrow P$

$(P \rightsquigarrow Q) \wedge [Q \ \Rightarrow \ Q'] \ \Rightarrow \ P \rightsquigarrow Q'$

$(P \rightsquigarrow Q) \wedge [P' \ \Rightarrow \ P] \ \Rightarrow \ P' \rightsquigarrow Q$

$\textbf{stable}.P \wedge \textbf{transient}.(P \wedge \neg Q) \ \Rightarrow \ P \rightsquigarrow (P \wedge Q)$

$(P \rightsquigarrow Q) \wedge (R \ \textbf{next} \ S) \ \Rightarrow \ (P \wedge R) \rightsquigarrow ((R \wedge Q) \vee (\neg R \wedge S))$

$(\forall m :: P \wedge M = m \rightsquigarrow (P \wedge M < m) \vee Q) \ \Rightarrow \ P \rightsquigarrow Q$

$(\forall m :: P \wedge M = m \ \textbf{next} \ (P \wedge M \leq m) \vee Q)$
$\quad \wedge \ (\forall m :: \textbf{transient}.(P \wedge M = m))$
$\quad \Rightarrow P \rightsquigarrow Q$

$(\forall i, m :: \{P \wedge M = m \wedge g_i\} \quad g_i \longrightarrow a_i \quad \{(P \wedge M < m) \vee Q\})$
$\quad \wedge \ (\forall i :: \neg g_i) \ \Rightarrow \ Q$
$\quad \Rightarrow P \rightsquigarrow Q$