α, β	type variables
n, m, i, j	index variables

$\alpha^+,\ \beta^+$	$::=$			positive variable
	$\vert$	α^+		
$\alpha^-,\ \beta^-$	$::=$			negative variable
	$\vert$	α^-		
σ	$::=$			substitution
	$\vert$	$\cdot$		
	$\vert$	$P/a+$		
	$\vert$	$N/a-$		
	$\vert$	$\vec{P}/\overrightarrow{\alpha^+}$		
	$\vert$	$\vec{N}/\overrightarrow{\alpha^-}$		
	$\vert$	$\overrightarrow{\widetilde{\alpha}^+}/\overrightarrow{\alpha^+}$		
	$\vert$	$\overrightarrow{\widetilde{\alpha}^-}/\overrightarrow{\alpha^-}$		
	$\vert$	$\overrightarrow{\widetilde{\alpha}^+}/\overrightarrow{\alpha^+}$		
	$\vert$	$\overrightarrow{\widehat{\alpha}^-}/\overrightarrow{\alpha^-}$		
	$\vert$	$vars_1/vars_2$		
	$\vert$	$\overline{\sigma_i}^{\,i}$		concatenate
e	$::=$			entry of a unification solution
	$\vert$	$\widehat{\alpha}^+ :\approx P$		
	$\vert$	$\widehat{\alpha}^- :\approx N$		
	$\vert$	$\widehat{\alpha}^+ :\geqslant P$		
$\widehat{\sigma}$	$::=$			unification solution (substitution)
	$\vert$	$\cdot$		
	$\vert$	e		
	$\vert$	$\widehat{\sigma}\backslash\overrightarrow{\widetilde{\alpha}^+}$		
	$\vert$	$\widehat{\sigma}\backslash\overrightarrow{\widehat{\alpha}^-}$		
	$\vert$	$\widehat{\sigma}\backslash\widehat{\alpha}^+$		
	$\vert$	$\widehat{\sigma}\backslash\widehat{\alpha}^-$		
	$\vert$	$\widehat{\sigma}_1 \cup \widehat{\sigma}_2$		
	$\vert$	$\overline{\widehat{\sigma}_i}^{\,i}$		concatenate
	$\vert$	$(\widehat{\sigma})$	S	
	$\vert$	$\widehat{\sigma}_1 \& \widehat{\sigma}_2$	M	
$P,\ Q$	$::=$			positive types
	$\vert$	$a+$		
	$\vert$	$\downarrow N$		
	$\vert$	$\exists\alpha^-.P$		
	$\vert$	$[\sigma]P$	M	
$N,\ M$	$::=$			negative types
	$\vert$	$a-$		
	$\vert$	$\uparrow P$		
	$\vert$	$\forall\alpha^+.N$		
	$\vert$	$P \to N$		
	$\vert$	$[\sigma]N$	M	

$\overrightarrow{\alpha^+},\ \overrightarrow{\beta^+}$	$::=$			positive variable list
	$\mid$	$\cdot$		empty list
	$\mid$	α^+		a variable
	$\mid$	$\overrightarrow{\overrightarrow{\alpha^+}_i}^{i}$		concatenate lists
$\overrightarrow{\alpha^-},\ \overrightarrow{\beta^-}$	$::=$			negative variables
	$\mid$	$\cdot$		empty list
	$\mid$	α^-		a variable
	$\mid$	$\overrightarrow{\overrightarrow{\alpha^-}_i}^{i}$		concatenate lists
$P,\ Q$	$::=$			multi-quantified positive types
	$\mid$	α^+		
	$\mid$	$\downarrow N$		
	$\mid$	$\exists\overrightarrow{\alpha^-}.P$		$P \neq \exists\ldots$
	$\mid$	$[\sigma]P$	M	
	$\mid$	$[\mu]P$	M	
	$\mid$	$P_1 \vee P_2$	M	
	$\mid$	$\mathbf{nf}\,(P')$	M	
$N,\ M$	$::=$			multi-quantified negative types
	$\mid$	α^-		
	$\mid$	$\uparrow P$		
	$\mid$	$P \to N$		
	$\mid$	$\forall\overrightarrow{\alpha^+}.N$		$N \neq \forall\ldots$
	$\mid$	$[\sigma]N$	M	
	$\mid$	$[\mu]N$	M	
	$\mid$	$\mathbf{nf}\,(N')$	M	
$\vec{P}$	$::=$			list of positive types
	$\mid$	$\cdot$		empty list
	$\mid$	P		a singel type
	$\mid$	$\overline{\vec{P}_i}^{i}$		concatenate lists
$\vec{N}$	$::=$			list of negative types
	$\mid$	$\cdot$		empty list
	$\mid$	N		a singel type
	$\mid$	$\overline{\vec{N}_i}^{i}$		concatenate lists
Γ	$::=$			declarative type context
	$\mid$	$\cdot$		empty context
	$\mid$	$vars$		
	$\mid$	$\overrightarrow{\alpha^+}$		list of variables
	$\mid$	$\overrightarrow{\alpha^-}$		list of variables
	$\mid$	$\overline{\Gamma_i}^{i}$		concatenate contexts
	$\mid$	(Γ)	S	
$\vec{\alpha},\ \vec{\beta}$	$::=$			ordered positive or negative variables
	$\mid$	$\cdot$		empty list
	$\mid$	$\overrightarrow{\alpha^+}$		list of variables

	$\vert$	$\overrightarrow{\alpha^-}$		list of variables
	$\vert$	$\vec{\alpha}_1 \backslash vars$		setminus
	$\vert$	$\overline{\vec{\alpha}_i}^{\,i}$		concatenate contexts
	$\vert$	$(\vec{\alpha})$	S	parenthesis
	$\vert$	$[\mu]\vec{\alpha}$	M	apply moving to list
	$\vert$	$\mathbf{ord}\, vars\, \mathbf{in}\, P$	M	
	$\vert$	$\mathbf{ord}\, vars\, \mathbf{in}\, N$	M	
	$\vert$	$\mathbf{ord}\, vars\, \mathbf{in}\, P$	M	
	$\vert$	$\mathbf{ord}\, vars\, \mathbf{in}\, N$	M	
$vars$	$::=$			set of variables
	$\vert$	$\varnothing$		empty set
	$\vert$	$\mathbf{fv}\, P$		free variables
	$\vert$	$\mathbf{fv}\, N$		free variables
	$\vert$	$\mathbf{fv}\, P$		free variables
	$\vert$	$\mathbf{fv}\, N$		free variables
	$\vert$	$vars_1 \cap vars_2$		set intersection
	$\vert$	$vars_1 \cup vars_2$		set union
	$\vert$	$vars_1 \backslash vars_2$		set complement
	$\vert$	$\mathbf{mv}\, P$		movable variables
	$\vert$	$\mathbf{mv}\, N$		movable variables
	$\vert$	$\mathbf{uv}\, N$		unification variables
	$\vert$	$\mathbf{uv}\, P$		unification variables
	$\vert$	$\mathbf{fv}\, N$		free variables
	$\vert$	$\mathbf{fv}\, P$		free variables
	$\vert$	$(vars)$	S	parenthesis
	$\vert$	Γ		context
	$\vert$	$\{\vec{\alpha}\}$		ordered list of variables
	$\vert$	$[\mu]vars$	M	apply moving to varset
μ	$::=$			
	$\vert$	$\cdot$		empty moving
	$\vert$	$\widetilde{\alpha}_1^+ \mapsto \widetilde{\alpha}_2^+$		Positive unit substitution
	$\vert$	$\widetilde{\alpha}_1^- \mapsto \widetilde{\alpha}_2^-$		Positive unit substitution
	$\vert$	$\mu_1 \cup \mu_2$	M	Set-like union of movings
	$\vert$	$\overline{\mu_i}^{\,i}$		concatenate movings
	$\vert$	$\mu\vert_{vars}$	M	restriction on a set
	$\vert$	μ^{-1}	M	inversion
n	$::=$			cohort index
	$\vert$	0		
	$\vert$	$n+1$		
$\widetilde{\alpha}^+$	$::=$			positive movable variable
	$\vert$	$\widetilde{\alpha}^{+n}$		
$\widetilde{\alpha}^-$	$::=$			negative movable variable
	$\vert$	$\widetilde{\alpha}^{-n}$		

$\overrightarrow{\widetilde{\alpha}^+},\ \overrightarrow{\widetilde{\beta}^+}$	$::=$			positive movable variable list
	$\mid$	$\cdot$		empty list
	$\mid$	$\widetilde{\alpha}^+$		a variable
	$\mid$	$\overrightarrow{\widetilde{\alpha^{+n}}}$		from a non-movable variable
	$\mid$	$\overline{\overrightarrow{\widetilde{\alpha}^+}_i}^{\,i}$		concatenate lists
$\overrightarrow{\widetilde{\alpha}^-},\ \overrightarrow{\widetilde{\beta}^-}$	$::=$			negatiive movable variable list
	$\mid$	$\cdot$		empty list
	$\mid$	$\widetilde{\alpha}^-$		a variable
	$\mid$	$\overrightarrow{\widetilde{\alpha^{-n}}}$		from a non-movable variable
	$\mid$	$\overline{\overrightarrow{\widetilde{\alpha}^-}_i}^{\,i}$		concatenate lists
$P,\ Q$	$::=$			multi-quantified positive types with movable variables
	$\mid$	α^+		
	$\mid$	$\widetilde{\alpha}^+$		
	$\mid$	$\downarrow N$		
	$\mid$	$\exists\overrightarrow{\alpha^-}.P$		
	$\mid$	$[\sigma]P$	M	
	$\mid$	$[\mu]P$	M	
$N,\ M$	$::=$			multi-quantified negative types with movable variables
	$\mid$	α^-		
	$\mid$	$\widetilde{\alpha}^-$		
	$\mid$	$\uparrow P$		
	$\mid$	$P \to N$		
	$\mid$	$\forall\overrightarrow{\alpha^+}.N$		
	$\mid$	$[\sigma]N$	M	
	$\mid$	$[\mu]N$	M	
$\widehat{\alpha}^+$	$::=$			positive unification variable
	$\mid$	$\widehat{\alpha}^+$		
$\widehat{\alpha}^-$	$::=$			negative unification variable
	$\mid$	$\widehat{\alpha}^-$		
	$\mid$	$\widehat{\alpha}^-_{\{N,M\}}$		
$\overrightarrow{\widehat{\alpha}^+},\ \overrightarrow{\widehat{\beta}^+}$	$::=$			positive unification variable list
	$\mid$	$\cdot$		empty list
	$\mid$	$\widehat{\alpha}^+$		a variable
	$\mid$	$\overrightarrow{\widehat{\alpha}^+\{vars\}}$		from a normal variable
	$\mid$	$\overrightarrow{\widehat{\alpha}^+}$		from a normal variable, context unspecified
	$\mid$	$\overline{\overrightarrow{\widehat{\alpha}^+}_i}^{\,i}$		concatenate lists
$\overrightarrow{\widehat{\alpha}^-},\ \overrightarrow{\widehat{\beta}^-}$	$::=$			negative unification variable list
	$\mid$	$\cdot$		empty list
	$\mid$	$\widehat{\alpha}^-$		a variable
	$\mid$	$\overrightarrow{\widehat{\alpha}^-\{vars\}}$		from a normal variable
	$\mid$	$\overrightarrow{\widehat{\alpha}^-}$		from a normal variable, context unspecified
	$\mid$	$\overline{\overrightarrow{\widehat{\alpha}^-}_i}^{\,i}$		concatenate lists

P, Q	::=			a positive algorithmic type (potentially with metavariables)
	|	α^+		
	|	$\widetilde{\alpha}^+$		
	|	$\widehat{\alpha}^+\{vars\}$		
	|	$\downarrow N$		
	|	$\exists\overrightarrow{\alpha^-}.P$		
	|	$[\sigma]P$	M	
	|	$[\mu]P$	M	
	|	$\mathbf{nf}\,(P')$	M	
N, M	::=			a negative algorithmic type (potentially with metavariables)
	|	α^-		
	|	$\widetilde{\alpha}^-$		
	|	$\widehat{\alpha}^-\{vars\}$		
	|	$\widehat{\alpha}^-$		
	|	$\uparrow P$		
	|	$P \rightarrow N$		
	|	$\forall\overrightarrow{\alpha^+}.N$		
	|	$[\sigma]N$	M	
	|	$[\mu]N$	M	
	|	$\mathbf{nf}\,(N')$	M	
terminals	::=			
	|	$\exists$		
	|	$\forall$		
	|	$\uparrow$		
	|	$\downarrow$		
	|	$\rightarrow$		
	|	$\leftrightarrow$		
	|	$\in$		
	|	$\notin$		
	|	$\cdot$		
	|	$\vdash$		
	|	$\leqslant$		
	|	$\geqslant$		
	|	$\simeq$		
	|	$\cup$		
	|	$\cap$		
	|	$\setminus$		
	|	$\subseteq$		
	|	$\mapsto$		
	|	$\stackrel{u}{\simeq}$		
	|	$\stackrel{a}{\simeq}$		
	|	$\varnothing$		
	|	$\models$		
	|	$\dashv$		
	|	$\neq$		
	|	$\equiv_n$		
	|	$\vee$		
	|	$\Downarrow$		

$formula$ ::=

| $judgement$
| $formula_1 \ \ .. \ \ formula_n$
| $\mu : vars_1 \leftrightarrow vars_2$
| μ **is bijective**
| $\widehat{\sigma}$ **is functional**
| $\widehat{\sigma}_1 \in \widehat{\sigma}_2$
| $vars_1 \subseteq vars_2$
| $vars_1 = vars_2$
| $vars$ **is fresh**
| $\alpha^- \notin vars$
| $\alpha^+ \notin vars$
| $\alpha^- \in vars$
| $\alpha^+ \in vars$
| if any other rule is not applicable
| $N \neq M$
| $P \neq Q$

$E1A$ ::=

| $n \vDash N \simeq_1^A M \dashv \mu$ — Negative multi-quantified type equivalence (algorit
| $n \vDash P \simeq_1^A Q \dashv \mu$ — Positive multi-quantified type equivalence (algorith

A ::=

| $\Gamma \vDash N \leqslant M \dashv \widehat{\sigma}$ — Negative subtyping
| $\Gamma \vDash P \geqslant Q \dashv \widehat{\sigma}$ — Positive supertyping

$E1$ ::=

| $N \simeq_1^D M$ — Negative multi-quantified type equivalence
| $P \simeq_1^D Q$ — Positive multi-quantified type equivalence

$D1$ ::=

| $\Gamma \vdash N \simeq_1^{\leqslant} M$ — Negative equivalence on MQ types
| $\Gamma \vdash P \simeq_1^{\leqslant} Q$ — Positive equivalence on MQ types
| $\Gamma \vdash N \leqslant_1 M$ — Negative subtyping
| $\Gamma \vdash P \geqslant_1 Q$ — Positive supertyping

$D0$ ::=

| $\Gamma \vdash N \simeq_0^{\leqslant} M$ — Negative equivalence
| $\Gamma \vdash P \simeq_0^{\leqslant} Q$ — Positive equivalence
| $\Gamma \vdash N \leqslant_0 M$ — Negative subtyping
| $\Gamma \vdash P \geqslant_0 Q$ — Positive supertyping

$LUBF$ ::=

| $P_1 \vee P_2 === Q$
| **ord** $vars$ **in** $P === \vec{\alpha}$
| **ord** $vars$ **in** $N === \vec{\alpha}$
| **ord** $vars$ **in** $P === \vec{\alpha}$
| **ord** $vars$ **in** $N === \vec{\alpha}$
| **nf** $(N') === N$

	$\mid$	$\mathbf{nf}\,(P') === P$	
	$\mid$	$\mathbf{nf}\,(N') === N$	
	$\mid$	$\mathbf{nf}\,(P') === P$	
	$\mid$	$\widehat{\sigma}_1 \& \widehat{\sigma}_2 === \widehat{\sigma}$	
LUB	$::=$		
	$\mid$	$P_1 \vee P_2 = Q$	Least Upper Bound (Least Common Supertype)
AU	$::=$		
	$\mid$	$\Gamma \models P_1 \overset{a}{\simeq} P_2 \dashv (Q, \widehat{\sigma}_1, \widehat{\sigma}_2)$	
	$\mid$	$\Gamma \models N_1 \overset{a}{\simeq} N_2 \dashv (M, \widehat{\sigma}_1, \widehat{\sigma}_2)$	
Order	$::=$		
	$\mid$	$\mathbf{ord}\ \mathit{vars}\ \mathbf{in}\ N = \vec{\alpha}$	
	$\mid$	$\mathbf{ord}\ \mathit{vars}\ \mathbf{in}\ P = \vec{\alpha}$	
	$\mid$	$\mathbf{ord}\ \mathit{vars}\ \mathbf{in}\ N = \vec{\alpha}$	
	$\mid$	$\mathbf{ord}\ \mathit{vars}\ \mathbf{in}\ P = \vec{\alpha}$	
Nrm	$::=$		
	$\mid$	$\mathbf{nf}\,(N) = M$	
	$\mid$	$\mathbf{nf}\,(P) = Q$	
	$\mid$	$\mathbf{nf}\,(N) = M$	
	$\mid$	$\mathbf{nf}\,(P) = Q$	
SM	$::=$		
	$\mid$	$e_1 \& e_2 = e_3$	Unification Solution Entry Merge
	$\mid$	$\widehat{\sigma}_1 \& \widehat{\sigma}_2 = \widehat{\sigma}_3$	Merge unification solutions
U	$::=$		
	$\mid$	$N \overset{u}{\simeq} M \dashv \widehat{\sigma}$	Negative unification
	$\mid$	$P \overset{u}{\simeq} Q \dashv \widehat{\sigma}$	Positive unification
WF	$::=$		
	$\mid$	$\Gamma \vdash N$	Negative type well-formedness
	$\mid$	$\Gamma \vdash P$	Positive type well-formedness
	$\mid$	$\Gamma \vdash N$	Negative type well-formedness
	$\mid$	$\Gamma \vdash P$	Positive type well-formedness
judgement	$::=$		
	$\mid$	*E1A*	
	$\mid$	*A*	
	$\mid$	*E1*	
	$\mid$	*D1*	
	$\mid$	*D0*	
	$\mid$	*LUB*	
	$\mid$	*AU*	
	$\mid$	*Order*	
	$\mid$	*Nrm*	
	$\mid$	*SM*	

$$
\begin{array}{lll}
 & | & U \\
 & | & WF \\
 & & \\
user\_syntax & ::= & \\
 & | & \alpha \\
 & | & n \\
 & | & \alpha^+ \\
 & | & \alpha^- \\
 & | & \sigma \\
 & | & e \\
 & | & \hat{\sigma} \\
 & | & P \\
 & | & N \\
 & | & \overrightarrow{\alpha^+} \\
 & | & \overrightarrow{\alpha^-} \\
 & | & P \\
 & | & N \\
 & | & \vec{P} \\
 & | & \vec{N} \\
 & | & \Gamma \\
 & | & \vec{\alpha} \\
 & | & vars \\
 & | & \mu \\
 & | & n \\
 & | & \widetilde{\alpha}^+ \\
 & | & \widetilde{\alpha}^- \\
 & | & \overrightarrow{\widetilde{\alpha}^+} \\
 & | & \overrightarrow{\widetilde{\alpha}^-} \\
 & | & P \\
 & | & N \\
 & | & \widehat{\alpha}^+ \\
 & | & \widehat{\alpha}^- \\
 & | & \overrightarrow{\widetilde{\alpha}^+} \\
 & | & \overrightarrow{\widehat{\alpha}^-} \\
 & | & P \\
 & | & N \\
 & | & terminals \\
 & | & formula
\end{array}
$$

$\boxed{n \models N \simeq_1^A M \dashv \mu}$ Negative multi-quantified type equivalence (algorithmic)

$$\frac{}{n \models \alpha^- \simeq_1^A \alpha^- \dashv \cdot}\ \textsc{E1ANVar}$$

$$\frac{n \models P \simeq_1^A Q \dashv \mu}{n \models \uparrow P \simeq_1^A \uparrow Q \dashv \mu}\ \textsc{E1AShiftU}$$

$$\frac{n \models P \simeq_1^A Q \dashv \mu_1 \quad n \models N \simeq_1^A M \dashv \mu_2 \quad \mu_1 \cup \mu_2\ \textbf{is bijective}}{n \models P \to N \simeq_1^A Q \to M \dashv \mu_1 \cup \mu_2}\ \textsc{E1AArrow}$$

$$\frac{n+1 \models [\overrightarrow{\widetilde{\alpha}^{+n}}/\overrightarrow{\alpha^{+}}]N \simeq_1^A [\overrightarrow{\widetilde{\beta}^{+n}}/\overrightarrow{\beta^{+}}]M \dashv \mu}{n \models \forall\overrightarrow{\alpha^{+}}.N \simeq_1^A \forall\overrightarrow{\beta^{+}}.M \dashv \mu|_{\mathbf{mv}\,M}} \quad \text{E1AForall}$$

$$\frac{}{n \models \widetilde{\alpha}^{-n} \simeq_1^A \widetilde{\beta}^{-n} \dashv \widetilde{\beta}^{-n} \mapsto \widetilde{\alpha}^{-n}} \quad \text{E1ANMVar}$$

$\boxed{n \models P \simeq_1^A Q \dashv \mu}$ Positive multi-quantified type equivalence (algorithmic)

$$\frac{}{n \models \alpha^{+} \simeq_1^A \alpha^{+} \dashv \cdot} \quad \text{E1APVar}$$

$$\frac{n \models N \simeq_1^A M \dashv \mu}{n \models {\downarrow}N \simeq_1^A {\downarrow}M \dashv \mu} \quad \text{E1AShiftD}$$

$$\frac{n+1 \models [\overrightarrow{\widetilde{\alpha}^{-n}}/\overrightarrow{\alpha^{-}}]P \simeq_1^A [\overrightarrow{\widetilde{\beta}^{-n}}/\overrightarrow{\beta^{-}}]Q \dashv \mu}{n \models \exists\overrightarrow{\alpha^{-}}.P \simeq_1^A \exists\overrightarrow{\beta^{-}}.Q \dashv \mu|_{\mathbf{mv}\,Q}} \quad \text{E1AExists}$$

$$\frac{}{n \models \widetilde{\alpha}^{+n} \simeq_1^A \widetilde{\beta}^{+n} \dashv \widetilde{\beta}^{+n} \mapsto \widetilde{\alpha}^{+n}} \quad \text{E1APMVar}$$

$\boxed{\Gamma \models N \leqslant M \dashv \widehat{\sigma}}$ Negative subtyping

$$\frac{}{\Gamma \models \alpha^{-} \leqslant \alpha^{-} \dashv \cdot} \quad \text{ANVar}$$

$$\frac{\mathbf{nf}\,(P) \overset{u}{\simeq} \mathbf{nf}\,(Q) \dashv \widehat{\sigma}}{\Gamma \models {\uparrow}P \leqslant {\uparrow}Q \dashv \widehat{\sigma}} \quad \text{AShiftU}$$

$$\frac{\Gamma \models P \geqslant Q \dashv \widehat{\sigma}_1 \quad \Gamma \models N \leqslant M \dashv \widehat{\sigma}_2}{\Gamma \models P \to N \leqslant Q \to M \dashv \widehat{\sigma}_1 \& \widehat{\sigma}_2} \quad \text{AArrow}$$

$$\frac{\Gamma, \overrightarrow{\beta^{+}} \models [\overrightarrow{\widehat{\alpha}^{+}\{\Gamma, \overrightarrow{\beta^{+}}\}}/\overrightarrow{\alpha^{+}}]N \leqslant M \dashv \widehat{\sigma}}{\Gamma \models \forall\overrightarrow{\alpha^{+}}.N \leqslant \forall\overrightarrow{\beta^{+}}.M \dashv \widehat{\sigma}\backslash\overrightarrow{\widehat{\alpha}^{+}}} \quad \text{AForall}$$

$\boxed{\Gamma \models P \geqslant Q \dashv \widehat{\sigma}}$ Positive supertyping

$$\frac{}{\Gamma \models \alpha^{+} \geqslant \alpha^{+} \dashv \cdot} \quad \text{APVar}$$

$$\frac{\mathbf{nf}\,(N) \overset{u}{\simeq} \mathbf{nf}\,(M) \dashv \widehat{\sigma}}{\Gamma \models {\downarrow}N \geqslant {\downarrow}M \dashv \widehat{\sigma}} \quad \text{AShiftD}$$

$$\frac{\Gamma, \overrightarrow{\beta^{-}} \models [\overrightarrow{\widehat{\alpha}^{-}\{\Gamma, \overrightarrow{\beta^{-}}\}}/\overrightarrow{\alpha^{-}}]P \geqslant Q \dashv \widehat{\sigma}}{\Gamma \models \exists\overrightarrow{\alpha^{-}}.P \geqslant \exists\overrightarrow{\beta^{-}}.Q \dashv \widehat{\sigma}} \quad \text{AExists}$$

$$\frac{\mathbf{nf}\,(P) = P' \quad vars_1 = \mathbf{fv}\,P' \backslash vars \quad vars_2\ \mathbf{is\ fresh}}{\Gamma \models \widehat{\alpha}^{+}\{vars\} \geqslant P \dashv (\widehat{\alpha}^{+} :\geqslant P' \vee [vars_2/vars_1]P')} \quad \text{APUVar}$$

$\boxed{N \simeq_1^D M}$ Negative multi-quantified type equivalence

$$\frac{}{\alpha^{-} \simeq_1^D \alpha^{-}} \quad \text{E1NVar}$$

$$\frac{P \simeq_1^D Q}{{\uparrow}P \simeq_1^D {\uparrow}Q} \quad \text{E1ShiftU}$$

$$\frac{P \simeq_1^D Q \quad N \simeq_1^D M}{P \to N \simeq_1^D Q \to M} \quad \text{E1Arrow}$$

$$\frac{\overrightarrow{\alpha^+} \cap \mathbf{fv}\, M = \varnothing \quad \mu : (\overrightarrow{\beta^+} \cap \mathbf{fv}\, M) \leftrightarrow (\overrightarrow{\alpha^+} \cap \mathbf{fv}\, N) \quad N \simeq_1^D [\mu]M}{\forall\overrightarrow{\alpha^+}.N \simeq_1^D \forall\overrightarrow{\beta^+}.M} \quad \text{E1Forall}$$

$\boxed{P \simeq_1^D Q}$ Positive multi-quantified type equivalence

$$\frac{}{\alpha^+ \simeq_1^D \alpha^+} \quad \text{E1PVar}$$

$$\frac{N \simeq_1^D M}{\downarrow N \simeq_1^D \downarrow M} \quad \text{E1ShiftD}$$

$$\frac{\overrightarrow{\alpha^-} \cap \mathbf{fv}\, Q = \varnothing \quad \mu : (\overrightarrow{\beta^-} \cap \mathbf{fv}\, Q) \leftrightarrow (\overrightarrow{\alpha^-} \cap \mathbf{fv}\, P) \quad P \simeq_1^D [\mu]Q}{\exists\overrightarrow{\alpha^-}.P \simeq_1^D \exists\overrightarrow{\beta^-}.Q} \quad \text{E1Exists}$$

$\boxed{\Gamma \vdash N \simeq_1^{\leqslant} M}$ Negative equivalence on MQ types

$$\frac{\Gamma \vdash N \leqslant_1 M \quad \Gamma \vdash M \leqslant_1 N}{\Gamma \vdash N \simeq_1^{\leqslant} M} \quad \text{D1NDef}$$

$\boxed{\Gamma \vdash P \simeq_1^{\leqslant} Q}$ Positive equivalence on MQ types

$$\frac{\Gamma \vdash P \geqslant_1 Q \quad \Gamma \vdash Q \geqslant_1 P}{\Gamma \vdash P \simeq_1^{\leqslant} Q} \quad \text{D1PDef}$$

$\boxed{\Gamma \vdash N \leqslant_1 M}$ Negative subtyping

$$\frac{}{\Gamma \vdash \alpha^- \leqslant_1 \alpha^-} \quad \text{D1NVar}$$

$$\frac{\Gamma \vdash P \simeq_1^{\leqslant} Q}{\Gamma \vdash \uparrow P \leqslant_1 \uparrow Q} \quad \text{D1ShiftU}$$

$$\frac{\Gamma \vdash P \geqslant_1 Q \quad \Gamma \vdash N \leqslant_1 M}{\Gamma \vdash P \to N \leqslant_1 Q \to M} \quad \text{D1Arrow}$$

$$\frac{\Gamma, \overrightarrow{\beta^+} \vdash P_i \quad \Gamma, \overrightarrow{\beta^+} \vdash [\overrightarrow{P}/\overrightarrow{\alpha^+}]N \leqslant_1 M}{\Gamma \vdash \forall\overrightarrow{\alpha^+}.N \leqslant_1 \forall\overrightarrow{\beta^+}.M} \quad \text{D1Forall}$$

$\boxed{\Gamma \vdash P \geqslant_1 Q}$ Positive supertyping

$$\frac{}{\Gamma \vdash \alpha^+ \geqslant_1 \alpha^+} \quad \text{D1PVar}$$

$$\frac{\Gamma \vdash N \simeq_1^{\leqslant} M}{\Gamma \vdash \downarrow N \geqslant_1 \downarrow M} \quad \text{D1ShiftD}$$

$$\frac{\Gamma, \overrightarrow{\beta^-} \vdash N_i \quad \Gamma, \overrightarrow{\beta^-} \vdash [\overrightarrow{N}/\overrightarrow{\alpha^-}]P \geqslant_1 Q'}{\Gamma \vdash \exists\overrightarrow{\alpha^-}.P \geqslant_1 \exists\overrightarrow{\beta^-}.Q} \quad \text{D1ExistsL}$$

$\boxed{\Gamma \vdash N \simeq_0^{\leqslant} M}$ Negative equivalence

$$\frac{\Gamma \vdash N \leqslant_0 M \quad \Gamma \vdash M \leqslant_0 N}{\Gamma \vdash N \simeq_0^{\leqslant} M} \quad \text{D0NDef}$$

$\boxed{\Gamma \vdash P \simeq_0^{\leqslant} Q}$ Positive equivalence

$$\frac{\Gamma \vdash P \geqslant_0 Q \quad \Gamma \vdash Q \geqslant_0 P}{\Gamma \vdash P \simeq_0^{\leqslant} Q} \quad \text{D0PDef}$$

$\boxed{\Gamma \vdash N \leqslant_0 M}$ Negative subtyping

$$\frac{}{\Gamma \vdash a- \leqslant_0 a-} \quad \text{D0NVar}$$

$$\frac{\Gamma \vdash P \simeq_0^{\leqslant} Q}{\Gamma \vdash \uparrow P \leqslant_0 \uparrow Q} \quad \text{D0ShiftU}$$

$$\frac{\Gamma \vdash P \quad \Gamma \vdash [P/a+]N \leqslant_0 M \quad M \neq \forall \beta^+ . M'}{\Gamma \vdash \forall \alpha^+ . N \leqslant_0 M} \quad \text{D0ForallL}$$

$$\frac{\Gamma, \alpha^+ \vdash N \leqslant_0 M}{\Gamma \vdash N \leqslant_0 \forall \alpha^+ . M} \quad \text{D0ForallR}$$

$$\frac{\Gamma \vdash P \geqslant_0 Q \quad \Gamma \vdash N \leqslant_0 M}{\Gamma \vdash P \to N \leqslant_0 Q \to M} \quad \text{D0Arrow}$$

$\boxed{\Gamma \vdash P \geqslant_0 Q}$ Positive supertyping

$$\frac{}{\Gamma \vdash a+ \geqslant_0 a+} \quad \text{D0PVar}$$

$$\frac{\Gamma \vdash N \simeq_0^{\leqslant} M}{\Gamma \vdash \downarrow N \geqslant_0 \downarrow M} \quad \text{D0ShiftD}$$

$$\frac{\Gamma \vdash N \quad \Gamma \vdash [N/a-]P \geqslant_0 Q \quad Q \neq \exists \alpha^- . Q'}{\Gamma \vdash \exists \alpha^- . P \geqslant_0 Q} \quad \text{D0ExistsL}$$

$$\frac{\Gamma, \alpha^- \vdash P \geqslant_0 Q}{\Gamma \vdash P \geqslant_0 \exists \alpha^- . Q} \quad \text{D0ExistsR}$$

$\boxed{P_1 \vee P_2}$

$\boxed{\textbf{ord}\ \mathit{vars}\ \textbf{in}\ P}$

$\boxed{\textbf{ord}\ \mathit{vars}\ \textbf{in}\ N}$

$\boxed{\textbf{ord}\ \mathit{vars}\ \textbf{in}\ P}$

$\boxed{\textbf{ord}\ \mathit{vars}\ \textbf{in}\ N}$

$\boxed{\textbf{nf}\ (N')}$

$\boxed{\textbf{nf}\ (P')}$

$\boxed{\textbf{nf}\ (N')}$

$\boxed{\mathbf{nf}\,(P')}$

$\boxed{\widehat{\sigma}_1 \& \widehat{\sigma}_2}$

$\boxed{P_1 \vee P_2 = Q}$ Least Upper Bound (Least Common Supertype)

$$\frac{}{\alpha^+ \vee \alpha^+ = \alpha^+}\ \textsc{LUBVar}$$

$$\frac{(\mathbf{fv}\, N \cup \mathbf{fv}\, M) \vDash {\downarrow}N \stackrel{a}{\simeq} {\downarrow}M \dashv (P, \widehat{\sigma}_1, \widehat{\sigma}_2)}{{\downarrow}N \vee {\downarrow}M = \exists\overrightarrow{\alpha^-}.[\overrightarrow{\alpha^-}/\mathbf{uv}\, P]P}\ \textsc{LUBShift}$$

$$\frac{\overrightarrow{\alpha^-} \cap \overrightarrow{\beta^-} = \varnothing}{\exists\overrightarrow{\alpha^-}.P_1 \vee \exists\overrightarrow{\beta^-}.P_2 = P_1 \vee P_2}\ \textsc{LUBExists}$$

$\boxed{\Gamma \vDash P_1 \stackrel{a}{\simeq} P_2 \dashv (Q, \widehat{\sigma}_1, \widehat{\sigma}_2)}$

$$\frac{}{\Gamma \vDash \alpha^+ \stackrel{a}{\simeq} \alpha^+ \dashv (\alpha^+, \cdot, \cdot)}\ \textsc{AUPVar}$$

$$\frac{\Gamma \vDash N_1 \stackrel{a}{\simeq} N_2 \dashv (M, \widehat{\sigma}_1, \widehat{\sigma}_2)}{\Gamma \vDash {\downarrow}N_1 \stackrel{a}{\simeq} {\downarrow}N_2 \dashv ({\downarrow}M, \widehat{\sigma}_1, \widehat{\sigma}_2)}\ \textsc{AUPShift}$$

$$\frac{\overrightarrow{\alpha^-} \cap \Gamma = \varnothing \quad \Gamma \vDash P_1 \stackrel{a}{\simeq} P_2 \dashv (Q, \widehat{\sigma}_1, \widehat{\sigma}_2)}{\Gamma \vDash \exists\overrightarrow{\alpha^-}.P_1 \stackrel{a}{\simeq} \exists\overrightarrow{\alpha^-}.P_2 \dashv (\exists\overrightarrow{\alpha^-}.\,Q, \widehat{\sigma}_1, \widehat{\sigma}_2)}\ \textsc{AUPExists}$$

$\boxed{\Gamma \vDash N_1 \stackrel{a}{\simeq} N_2 \dashv (M, \widehat{\sigma}_1, \widehat{\sigma}_2)}$

$$\frac{}{\Gamma \vDash \alpha^- \stackrel{a}{\simeq} \alpha^- \dashv (\alpha^-, \cdot, \cdot)}\ \textsc{AUNVar}$$

$$\frac{\Gamma \vDash P_1 \stackrel{a}{\simeq} P_2 \dashv (Q, \widehat{\sigma}_1, \widehat{\sigma}_2)}{\Gamma \vDash {\uparrow}P_1 \stackrel{a}{\simeq} {\uparrow}P_2 \dashv ({\uparrow}Q, \widehat{\sigma}_1, \widehat{\sigma}_2)}\ \textsc{AUNShift}$$

$$\frac{\Gamma \vDash P_1 \stackrel{a}{\simeq} P_2 \dashv (Q, \widehat{\sigma}_1, \widehat{\sigma}_2) \quad \Gamma \vDash N_1 \stackrel{a}{\simeq} N_2 \dashv (M, \widehat{\sigma}'_1, \widehat{\sigma}'_2)}{\Gamma \vDash P_1 \to N_1 \stackrel{a}{\simeq} P_2 \to N_2 \dashv (Q \to M, \widehat{\sigma}_1 \cup \widehat{\sigma}'_1, \widehat{\sigma}_2 \cup \widehat{\sigma}'_2)}\ \textsc{AUNArrow}$$

$$\frac{\text{if any other rule is not applicable} \quad \Gamma \vdash N \quad \Gamma \vdash M}{\Gamma \vDash N \stackrel{a}{\simeq} M \dashv (\widehat{\alpha}^-_{\{N,M\}}, (\widehat{\alpha}^-_{\{N,M\}} :\approx N), (\widehat{\alpha}^-_{\{N,M\}} :\approx M))}\ \textsc{AUNAU}$$

$\boxed{\mathbf{ord}\, \mathit{vars}\, \mathbf{in}\, N = \vec{\alpha}}$
$\boxed{\mathbf{ord}\, \mathit{vars}\, \mathbf{in}\, P = \vec{\alpha}}$
$\boxed{\mathbf{ord}\, \mathit{vars}\, \mathbf{in}\, N = \vec{\alpha}}$

$$\frac{\alpha^- \in \mathit{vars}}{\mathbf{ord}\, \mathit{vars}\, \mathbf{in}\, \alpha^- = \alpha^-}\ \textsc{ONVarIn}$$

$$\frac{\alpha^- \notin \mathit{vars}}{\mathbf{ord}\, \mathit{vars}\, \mathbf{in}\, \alpha^- = \cdot}\ \textsc{ONVarNIn}$$

$$\frac{}{\mathbf{ord}\ vars\ \mathbf{in}\ \widehat{\alpha}^-\{vars'\} = \cdot}\ \textsc{ONUVar}$$

$$\frac{\mathbf{ord}\ vars\ \mathbf{in}\ P = \vec{\alpha}}{\mathbf{ord}\ vars\ \mathbf{in}\ \uparrow P = \vec{\alpha}}\ \textsc{OShiftU}$$

$$\frac{\mathbf{ord}\ vars\ \mathbf{in}\ P = \vec{\alpha}_1 \quad \mathbf{ord}\ vars\ \mathbf{in}\ N = \vec{\alpha}_2}{\mathbf{ord}\ vars\ \mathbf{in}\ P \to N = \vec{\alpha}_1, (\vec{\alpha}_2 \backslash \{\vec{\alpha}_1\})}\ \textsc{OArrow}$$

$$\frac{vars \cap \overrightarrow{\alpha^+} = \varnothing \quad \mathbf{ord}\ vars\ \mathbf{in}\ N = \vec{\alpha}}{\mathbf{ord}\ vars\ \mathbf{in}\ \forall\overrightarrow{\alpha^+}.N = \vec{\alpha}}\ \textsc{OForall}$$

$\boxed{\mathbf{ord}\ vars\ \mathbf{in}\ P = \vec{\alpha}}$

$$\frac{\alpha^+ \in vars}{\mathbf{ord}\ vars\ \mathbf{in}\ \alpha^+ = \alpha^+}\ \textsc{OPVarIn}$$

$$\frac{\alpha^+ \notin vars}{\mathbf{ord}\ vars\ \mathbf{in}\ \alpha^+ = \cdot}\ \textsc{OPVarNIn}$$

$$\frac{}{\mathbf{ord}\ vars\ \mathbf{in}\ \widehat{\alpha}^+\{vars'\} = \cdot}\ \textsc{OPUVar}$$

$$\frac{\mathbf{ord}\ vars\ \mathbf{in}\ N = \vec{\alpha}}{\mathbf{ord}\ vars\ \mathbf{in}\ \downarrow N = \vec{\alpha}}\ \textsc{OShiftD}$$

$$\frac{vars \cap \overrightarrow{\alpha^-} = \varnothing \quad \mathbf{ord}\ vars\ \mathbf{in}\ P = \vec{\alpha}}{\mathbf{ord}\ vars\ \mathbf{in}\ \exists\overrightarrow{\alpha^-}.P = \vec{\alpha}}\ \textsc{OExists}$$

$\boxed{\mathbf{nf}\ (N) = M}$

$\boxed{\mathbf{nf}\ (P) = Q}$

$\boxed{\mathbf{nf}\ (N) = M}$

$$\frac{}{\mathbf{nf}\ (\alpha^-) = \alpha^-}\ \textsc{NrmNVar}$$

$$\frac{}{\mathbf{nf}\ (\widehat{\alpha}^-\{vars\}) = \widehat{\alpha}^-\{vars\}}\ \textsc{NrmNUVar}$$

$$\frac{\mathbf{nf}\ (P) = Q}{\mathbf{nf}\ (\uparrow P) = \uparrow Q}\ \textsc{NrmShiftU}$$

$$\frac{\mathbf{nf}\ (P) = Q \quad \mathbf{nf}\ (N) = M}{\mathbf{nf}\ (P \to N) = Q \to M}\ \textsc{NrmArrow}$$

$$\frac{\mathbf{nf}\ (N) = N' \quad \mathbf{ord}\ \overrightarrow{\alpha^+}\ \mathbf{in}\ N' = \overrightarrow{\alpha^+}'}{\mathbf{nf}\ (\forall\overrightarrow{\alpha^+}.N) = \forall\overrightarrow{\alpha^+}'.N'}\ \textsc{NrmForall}$$

$\boxed{\mathbf{nf}\ (P) = Q}$

$$\frac{}{\mathbf{nf}\ (\alpha^+) = \alpha^+}\ \textsc{NrmPVar}$$

$$\frac{}{\mathbf{nf}\ (\widehat{\alpha}^+\{vars\}) = \widehat{\alpha}^+\{vars\}}\ \textsc{NrmPUVar}$$

$$\frac{\mathbf{nf}\ (N) = M}{\mathbf{nf}\ (\downarrow N) = \downarrow M}\ \textsc{NrmShiftD}$$

$$\frac{\mathbf{nf}\ (P) = P' \quad \mathbf{ord}\ \overrightarrow{\alpha^-}\ \mathbf{in}\ P' = \overrightarrow{\alpha^-}'}{\mathbf{nf}\ (\exists\overrightarrow{\alpha^-}.P) = \exists\overrightarrow{\alpha^-}'.P'}\ \textsc{NrmExists}$$

$\boxed{e_1 \& e_2 = e_3}$ Unification Solution Entry Merge

$$\frac{}{\widehat{\alpha}^+ :\geqslant P \& \widehat{\alpha}^+ :\geqslant Q = \widehat{\alpha}^+ :\geqslant P \vee Q} \quad \text{SMEPSupSup}$$

$$\frac{\mathbf{fv}\, P \cup \mathbf{fv}\, Q \models P \geqslant Q \dashv \widehat{\sigma}'}{\widehat{\alpha}^+ :\approx P \& \widehat{\alpha}^+ :\geqslant Q = \widehat{\alpha}^+ :\approx P} \quad \text{SMEPEqSup}$$

$$\frac{\mathbf{fv}\, P \cup \mathbf{fv}\, Q \models Q \geqslant P \dashv \widehat{\sigma}'}{\widehat{\alpha}^+ :\geqslant P \& \widehat{\alpha}^+ :\approx Q = \widehat{\alpha}^+ :\approx Q} \quad \text{SMEPSupEq}$$

$$\frac{}{\widehat{\alpha}^+ :\approx P \& \widehat{\alpha}^+ :\approx P = \widehat{\alpha}^+ :\approx P} \quad \text{SMEPEqEq}$$

$$\frac{}{\widehat{\alpha}^- :\approx N \& \widehat{\alpha}^- :\approx N = \widehat{\alpha}^- :\approx N} \quad \text{SMENEqEq}$$

$\boxed{\widehat{\sigma}_1 \& \widehat{\sigma}_2 = \widehat{\sigma}_3}$ Merge unification solutions

$$\frac{}{\cdot \& \widehat{\sigma} = \widehat{\sigma}} \quad \text{SMEmpty}$$

$$\frac{(\widehat{\alpha}^+ :\approx P) \in \widehat{\sigma}_2 \qquad \widehat{\sigma}_1 \& (\widehat{\sigma}_2 \backslash \widehat{\alpha}^+) = \widehat{\sigma}_3}{(\widehat{\alpha}^+ :\approx P, \widehat{\sigma}_1) \& \widehat{\sigma}_2 = (\widehat{\alpha}^+ :\approx P, \widehat{\sigma}_3)} \quad \text{SMPEqEq}$$

$$\frac{(\widehat{\alpha}^+ :\geqslant Q) \in \widehat{\sigma}_2 \quad \widehat{\sigma}_1 \& (\widehat{\sigma}_2 \backslash \widehat{\alpha}^+) = \widehat{\sigma}_3}{(\widehat{\alpha}^+ :\geqslant P, \widehat{\sigma}_1) \& \widehat{\sigma}_2 = (\widehat{\alpha}^+ :\geqslant P \vee Q, \widehat{\sigma}_3)} \quad \text{SMPSupSup}$$

$$\frac{(\widehat{\alpha}^+ :\approx Q) \in \widehat{\sigma}_2 \quad \mathbf{fv}\, Q \cup \mathbf{fv}\, P \models Q \geqslant P \dashv \widehat{\sigma}' \qquad \widehat{\sigma}_1 \& (\widehat{\sigma}_2 \backslash \widehat{\alpha}^+) = \widehat{\sigma}_3}{(\widehat{\alpha}^+ :\geqslant P, \widehat{\sigma}_1) \& \widehat{\sigma}_2 = (\widehat{\alpha}^+ :\approx Q, \widehat{\sigma}_3)} \quad \text{SMPSupEq}$$

$$\frac{(\widehat{\alpha}^+ :\geqslant Q) \in \widehat{\sigma}_2 \quad \mathbf{fv}\, Q \cup \mathbf{fv}\, P \models P \geqslant Q \dashv \widehat{\sigma}' \qquad \widehat{\sigma}_1 \& (\widehat{\sigma}_2 \backslash \widehat{\alpha}^+) = \widehat{\sigma}_3}{(\widehat{\alpha}^+ :\approx P, \widehat{\sigma}_1) \& \widehat{\sigma}_2 = (\widehat{\alpha}^+ :\approx P, \widehat{\sigma}_3)} \quad \text{SMPEqSup}$$

$$\frac{(\widehat{\alpha}^- :\approx N) \in \widehat{\sigma}_2 \qquad \widehat{\sigma}_1 \& (\widehat{\sigma}_2 \backslash \widehat{\alpha}^-) = \widehat{\sigma}_3}{(\widehat{\alpha}^- :\approx N, \widehat{\sigma}_1) \& \widehat{\sigma}_2 = (\widehat{\alpha}^- :\approx N, \widehat{\sigma}_3)} \quad \text{SMNEqEq}$$

$\boxed{N \stackrel{u}{\simeq} M \dashv \widehat{\sigma}}$ Negative unification

$$\frac{}{\alpha^- \stackrel{u}{\simeq} \alpha^- \dashv \cdot} \quad \text{UNVar}$$

$$\frac{P \stackrel{u}{\simeq} Q \dashv \widehat{\sigma}}{\uparrow P \stackrel{u}{\simeq} \uparrow Q \dashv \widehat{\sigma}} \quad \text{UShiftU}$$

$$\frac{P \stackrel{u}{\simeq} Q \dashv \widehat{\sigma}_1 \quad N \stackrel{u}{\simeq} M \dashv \widehat{\sigma}_2}{P \to N \stackrel{u}{\simeq} Q \to M \dashv \widehat{\sigma}_1 \& \widehat{\sigma}_2} \quad \text{UArrow}$$

$$\frac{N \stackrel{u}{\simeq} M \dashv \widehat{\sigma}}{\forall \overrightarrow{\alpha^+}. N \stackrel{u}{\simeq} \forall \overrightarrow{\alpha^+}. M \dashv \widehat{\sigma}} \quad \text{UForall}$$

$$\frac{\mathbf{fv}\, N \subseteq \mathit{vars}}{\widehat{\alpha}^-\{\mathit{vars}\} \stackrel{u}{\simeq} N \dashv \widehat{\alpha}^- :\approx N} \quad \text{UNUVar}$$

$\boxed{P \stackrel{u}{\simeq} Q \dashv \widehat{\sigma}}$ Positive unification

$$\frac{}{\alpha^+ \overset{u}{\simeq} \alpha^+ \dashv \cdot}\quad \text{UPVar}$$

$$\frac{\boxed{N} \overset{u}{\simeq} M \dashv \widehat{\sigma}}{\downarrow \boxed{N} \overset{u}{\simeq} \downarrow M \dashv \widehat{\sigma}}\quad \text{UShiftD}$$

$$\frac{\boxed{P} \overset{u}{\simeq} Q \dashv \widehat{\sigma}}{\exists \overrightarrow{\alpha^-}. \boxed{P} \overset{u}{\simeq} \exists \overrightarrow{\alpha^-}. Q \dashv \widehat{\sigma}}\quad \text{UExists}$$

$$\frac{\mathbf{fv}\, P \subseteq \mathit{vars}}{\widehat{\alpha}^+\{\mathit{vars}\} \overset{u}{\simeq} P \dashv \widehat{\alpha}^+ :\approx P}\quad \text{UPUVar}$$

$\boxed{\Gamma \vdash N}$ Negative type well-formedness

$\boxed{\Gamma \vdash P}$ Positive type well-formedness

$\boxed{\Gamma \vdash N}$ Negative type well-formedness

$\boxed{\Gamma \vdash P}$ Positive type well-formedness

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Definition rules:        94 good    0 bad
Definition rule clauses: 165 good    0 bad
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