1 Syntax

The difference between the surface and core syntax is that the surface spines can have underscores.
Notice that all the types are *core* types.

(Core) Types

$$A, B, C, D \quad ::= \quad 1 \mid \Pi x : A. B \mid \forall x : A. B \mid e_1 = e_2 : A$$

(Core) Contexts

$$\Gamma \quad ::= \quad \cdot \mid x : A \mid \Gamma_1, \Gamma_2$$

Core Terms

$$e, p \quad ::= \quad x \mid <> \mid \lambda^{\Pi} x : A. e \mid \lambda^{\forall} x : A. e \mid e(\vec{s}) \mid \mathbf{refl}\, e \mid \mathbf{subst}\, (p : e_1 = e_2 : A, x. B, e)$$

Core Spines

$$\vec{s} \quad ::= \quad \cdot \mid e \mid \{e\} \mid \vec{s}_1, \vec{s}_2$$

Surface Terms

$$\underline{e}, \underline{p} \quad ::= \quad x \mid <> \mid \lambda^{\Pi} x : A. \underline{e} \mid \lambda^{\forall} x : A. \underline{e} \mid \underline{e}(\overrightarrow{\underline{ss}}) \mid \mathbf{refl}\, \underline{e} \mid \mathbf{subst}\, (\underline{p} : \underline{e}_1 = \underline{e}_2 : A, x. B, \underline{e})$$

Surface Spines

$$\overrightarrow{\underline{ss}} \quad ::= \quad \cdot \mid \underline{e} \mid \{\underline{e}\} \mid \{\_\} \mid \overrightarrow{\underline{ss}}_1, \overrightarrow{\underline{ss}}_2$$

2   Core

$$\boxed{\Gamma \vdash e \Leftarrow A}$$

$$\frac{\Gamma \vdash e \Rightarrow A' \quad \Gamma \vdash A' \equiv A}{\Gamma \vdash e \Leftarrow A} \quad \text{CoreCSwitch}$$

$$\boxed{\Gamma \vdash e \Rightarrow A}$$

$$\frac{x : A \in \Gamma}{\Gamma \vdash x \Rightarrow A} \quad \text{CoreIVar}$$

$$\frac{}{\Gamma \vdash <> \Rightarrow 1} \quad \text{CoreIUnit}$$

$$\frac{\Gamma, x : A \vdash e \Rightarrow B}{\Gamma \vdash \lambda^\Pi x : A.\, e \Rightarrow \Pi x : A.\, B} \quad \text{CoreILam}$$

$$\frac{\Gamma, x : A \vdash e \Rightarrow B}{\Gamma \vdash \lambda^\forall x : A.\, e \Rightarrow \forall x : A'.\, B} \quad \text{CoreIPLam}$$

$$\frac{\Gamma \vdash e \Rightarrow A \quad \Gamma \vdash \vec{s} : A \gg B}{\Gamma \vdash e(\vec{s}) \Rightarrow B} \quad \text{CoreIApp}$$

$$\frac{\Gamma \vdash e \Rightarrow A}{\Gamma \vdash \mathbf{refl}\, e \Rightarrow e = e : A} \quad \text{CoreIRefl}$$

$$\frac{\begin{array}{c}\Gamma \vdash A \quad \Gamma, x : A \vdash B \\ \Gamma \vdash e_1 \Leftarrow A \quad \Gamma \vdash e_2 \Leftarrow A \\ \Gamma \vdash p \Leftarrow e_1 = e_2 : A \\ \Gamma \vdash e \Leftarrow [e_1/x]B\end{array}}{\Gamma \vdash \mathbf{subst}\,(p : e_1 = e_2 : A, x.\, B, e) \Rightarrow [e_2/x]B} \quad \text{CoreISubst}$$

$$\boxed{\Gamma \vdash \vec{s} : A \gg B}$$

$$\frac{}{\Gamma \vdash \cdot : A \gg A} \quad \text{CoreSAEmpty}$$

$$\frac{\begin{array}{c}\Gamma \vdash \Pi x : B.\, A \\ \Gamma \vdash e \Leftarrow B \quad \Gamma \vdash \vec{s} : [e/x]A \gg C\end{array}}{\Gamma \vdash e, \vec{s} : \Pi x : B.\, A \gg C} \quad \text{CoreSAArg}$$

$$\frac{\begin{array}{c}\Gamma \vdash \forall x : B.\, A \\ \Gamma \vdash e \Leftarrow B \quad \Gamma \vdash \vec{s} : [e/x]A \gg C\end{array}}{\Gamma \vdash \{e\}, \vec{s} : \forall x : B.\, A \gg C} \quad \text{CoreSAImpArg}$$

$$\boxed{\Gamma \vdash A \equiv B} \quad \text{Type Conversion}$$

$$\frac{\Gamma \vdash A \equiv A' \quad \Gamma, x : A \vdash B \equiv B'}{\Gamma \vdash \Pi x : A.\, B \equiv \Pi x : A'.\, B'} \quad \text{CoreTCPi}$$

$$\frac{\Gamma \vdash A \equiv A' \quad \Gamma, x : A \vdash B \equiv B'}{\Gamma \vdash \forall x : A.\, B \equiv \forall x : A'.\, B'} \quad \text{CoreTCForall}$$

$$\frac{\Gamma \vdash A \equiv B \quad \Gamma \vdash e_1 \equiv p_1 \Leftarrow A \quad \Gamma \vdash e_2 \equiv p_2 \Leftarrow A}{\Gamma \vdash e_1 = e_2 : A \equiv p_1 = p_2 : B} \quad \textsc{CoreTCEq}$$

$$\frac{}{\Gamma \vdash A \equiv A} \quad \textsc{CoreTCReflC}$$

$$\frac{\Gamma \vdash A \equiv B}{\Gamma \vdash B \equiv A} \quad \textsc{CoreTCSymC}$$

$$\frac{\Gamma \vdash A \equiv B \quad \Gamma \vdash B \equiv C}{\Gamma \vdash A \equiv C} \quad \textsc{CoreTCTransC}$$

$\boxed{\Gamma \vdash e_1 \equiv e_2 \Leftarrow A}$ Checking Conversion

$$\frac{\Gamma \vdash e_1 \equiv e_2 \Rightarrow A \quad \Gamma \vdash A \equiv B}{\Gamma \vdash e_1 \equiv e_2 \Leftarrow B} \quad \textsc{CoreCCSwitch}$$

$$\frac{\Gamma \vdash A_1 \equiv A \quad \Gamma \vdash A_2 \equiv A \quad \Gamma, x : A \vdash e_1 \equiv e_2 \Leftarrow B}{\Gamma \vdash \lambda^\Pi x : A_1.\, e_1 \equiv \lambda^\Pi x : A_2.\, e_2 \Leftarrow \Pi x : A.\, B} \quad \textsc{CoreCCLam}$$

$$\frac{\Gamma \vdash A_1 \equiv A \quad \Gamma \vdash A_2 \equiv A \quad \Gamma, x : A \vdash e_1 \equiv e_2 \Leftarrow B}{\Gamma \vdash \lambda^\forall x : A_1.\, e_1 \equiv \lambda^\forall x : A_2.\, e_2 \Leftarrow \forall x : A.\, B} \quad \textsc{CoreCCPLam}$$

$$\frac{\Gamma \vdash p \equiv p' \Leftarrow A \quad \Gamma \vdash e_1 \equiv p \Leftarrow A \quad \Gamma \vdash e_2 \equiv p \Leftarrow A}{\Gamma \vdash \mathbf{refl}\, e_1 \equiv \mathbf{refl}\, e_2 \Leftarrow (p = p' : A)} \quad \textsc{CoreCCRefl}$$

$$\frac{}{\Gamma \vdash e \equiv e \Leftarrow A} \quad \textsc{CoreCCReflC}$$

$$\frac{\Gamma \vdash e_1 \equiv e_2 \Leftarrow A}{\Gamma \vdash e_2 \equiv e_1 \Leftarrow A} \quad \textsc{CoreCCSymC}$$

$$\frac{\Gamma \vdash e_1 \equiv e_2 \Leftarrow A \quad \Gamma \vdash e_2 \equiv e_3 \Leftarrow A}{\Gamma \vdash e_1 \equiv e_3 \Leftarrow A} \quad \textsc{CoreCCTransC}$$

$$\frac{\Gamma \vdash e_2 \Leftarrow A \quad \Gamma, x : A \vdash e_1(\vec{s}) \Leftarrow B}{\Gamma \vdash (\lambda^\Pi x : A.\, e_1)(e_2, \vec{s}) \equiv [e_2/x]e_1(\vec{s}) \Leftarrow B} \quad \textsc{CoreCCBetaR}$$

$$\frac{\Gamma \vdash e_2 \Leftarrow A \quad \Gamma, x : A \vdash e_1(\vec{s}) \Leftarrow B}{\Gamma \vdash (\lambda^\forall x : A.\, e_1)(\{e_2\}, \vec{s}) \equiv [e_2/x]e_1(\vec{s}) \Leftarrow B} \quad \textsc{CoreCCBetaRImp}$$

$$\frac{\Gamma \vdash e \Leftarrow \Pi x : A.\, B}{\Gamma \vdash \lambda^\Pi x : A.\, e(x) \equiv e \Leftarrow \Pi x : A.\, B} \quad \textsc{CoreCCEtaR}$$

$$\frac{\Gamma \vdash e \Leftarrow \forall x : A.\, B}{\Gamma \vdash \lambda^\Pi x : A.\, e(\{x\}) \equiv e \Leftarrow \forall x : A.\, B} \quad \textsc{CoreCCEtaRImp}$$

$\boxed{\Gamma \vdash \vec{s}_1 \equiv \vec{s}_2 : A \gg B}$ Spine Conversion

$$\frac{}{\Gamma \vdash \cdot \equiv \cdot : A \gg A} \quad \textsc{CoreSCEmpty}$$

$$\frac{\Gamma \vdash e_1 \equiv e_2 \Leftarrow A \quad \Gamma \vdash \vec{s}_1 \equiv \vec{s}_2 : [e_1/x]B \gg C}{\Gamma \vdash e_1, \vec{s}_1 \equiv e_2, \vec{s}_2 : \Pi x : A. B \gg C} \quad \text{CoreSCArg}$$

$$\frac{\Gamma \vdash e_1 \equiv e_2 \Leftarrow A \quad \Gamma \vdash \vec{s}_1 \equiv \vec{s}_2 : [e_1/x]B \gg C}{\Gamma \vdash \{e_1\}, \vec{s}_1 \equiv \{e_2\}, \vec{s}_2 : \forall x : A. B \gg C} \quad \text{CoreSCImpImpArg}$$

$\boxed{\Gamma \vdash A}$

$$\frac{}{\Gamma \vdash 1} \quad \text{CoreWFUnit}$$

$$\frac{\Gamma \vdash A \quad \Gamma, x : A \vdash B}{\Gamma \vdash \Pi x : A. B} \quad \text{CoreWFPi}$$

$$\frac{\Gamma \vdash A \quad \Gamma, x : A \vdash B}{\Gamma \vdash \forall x : A. B} \quad \text{CoreWFForall}$$

$$\frac{\Gamma \vdash A \quad \Gamma \vdash e_1 \Leftarrow A \quad \Gamma \vdash e_2 \Leftarrow A}{\Gamma \vdash e_1 = e_2 : A} \quad \text{CoreWFEq}$$

3 Surface to Core

$$\boxed{\Gamma \vdash \underline{e} \Leftarrow A \rightsquigarrow e}$$

$$\frac{\Gamma \vdash \underline{e} \Rightarrow A \rightsquigarrow e \quad \Gamma \vdash A \equiv B}{\Gamma \vdash \underline{e} \Leftarrow B \rightsquigarrow e} \quad \textsc{TypCSwitch}$$

$$\boxed{\Gamma \vdash \underline{e} \Rightarrow A \rightsquigarrow e}$$

$$\frac{x : A \in \Gamma}{\Gamma \vdash x \Rightarrow A \rightsquigarrow x} \quad \textsc{TypIVar}$$

$$\frac{}{\Gamma \vdash <> \Rightarrow 1 \rightsquigarrow <>} \quad \textsc{TypIUnit}$$

$$\frac{\Gamma, x : A \vdash \underline{e} \Rightarrow B \rightsquigarrow e'}{\Gamma \vdash \lambda^\Pi x : A. \underline{e} \Rightarrow \Pi x : A. B \rightsquigarrow \lambda^\Pi x : A. e'} \quad \textsc{TypILam}$$

$$\frac{\Gamma, x : A \vdash \underline{e} \Rightarrow B \rightsquigarrow e'}{\Gamma \vdash \lambda^\forall x : A. \underline{e} \Rightarrow \forall x : A. B \rightsquigarrow \lambda^\forall x : A. e'} \quad \textsc{TypIPLam}$$

$$\frac{\Gamma \vdash \underline{e} \Rightarrow A \rightsquigarrow e \quad \Gamma \vdash \overrightarrow{\underline{ss}} : A \gg B \rightsquigarrow \vec{s}}{\Gamma \vdash \underline{e}(\overrightarrow{\underline{ss}}) \Rightarrow B \rightsquigarrow e(\vec{s})} \quad \textsc{TypIApp}$$

$$\frac{\Gamma \vdash \underline{e} \Rightarrow A \rightsquigarrow e}{\Gamma \vdash \textbf{refl } \underline{e} \Rightarrow e = e : A \rightsquigarrow \textbf{refl } e} \quad \textsc{TypIRefl}$$

$$\frac{\begin{array}{c} \Gamma \vdash A \quad \Gamma, x : A \vdash B \\ \Gamma \vdash \underline{e}_1 \Leftarrow A \rightsquigarrow e_1 \quad \Gamma \vdash \underline{e}_2 \Leftarrow A \rightsquigarrow e_2 \\ \Gamma \vdash \underline{p} \Leftarrow e_1 = e_2 : A \rightsquigarrow p \\ \Gamma \vdash \underline{e} \Leftarrow [e_1/x]B \rightsquigarrow e \end{array}}{\Gamma \vdash \textbf{subst} \,(\underline{p} : \underline{e}_1 = \underline{e}_2 : A, x. B, \underline{e}) \Rightarrow [e_2/x]B \rightsquigarrow \textbf{subst} \,(p : e_1 = e_2 : A, x. B, e)} \quad \textsc{TypISubst}$$

$$\boxed{\Gamma \vdash \overrightarrow{\underline{ss}} : A \gg B \rightsquigarrow \vec{s}}$$

$$\frac{}{\Gamma \vdash \cdot : A \gg A \rightsquigarrow \cdot} \quad \textsc{TypSAEmpty}$$

$$\frac{\begin{array}{c} \Gamma \vdash \Pi x : B. A \\ \Gamma \vdash \underline{e} \Leftarrow B \rightsquigarrow e \quad \Gamma \vdash \overrightarrow{\underline{ss}} : [e/x]A \gg C \rightsquigarrow \vec{s} \end{array}}{\Gamma \vdash \underline{e}, \overrightarrow{\underline{ss}} : \Pi x : B. A \gg C \rightsquigarrow e, \vec{s}} \quad \textsc{TypSAArg}$$

$$\frac{\begin{array}{c} \Gamma \vdash \forall x : B. A \\ \Gamma \vdash \underline{e} \Leftarrow B \rightsquigarrow e \quad \Gamma \vdash \overrightarrow{\underline{ss}} : [e/x]A \gg C \rightsquigarrow \vec{s} \end{array}}{\Gamma \vdash \{\underline{e}\}, \overrightarrow{\underline{ss}} : \forall x : B. A \gg C \rightsquigarrow \{e\}, \vec{s}} \quad \textsc{TypSAImpArg}$$

$$\frac{\begin{array}{c} \Gamma \vdash \forall x : B. A \\ \Gamma \vdash e \Leftarrow B \quad \Gamma \vdash \overrightarrow{\underline{ss}} : [e/x]A \gg C \rightsquigarrow \vec{s} \end{array}}{\Gamma \vdash \{\_\}, \overrightarrow{\underline{ss}} : \forall x : B. A \gg C \rightsquigarrow \{e\}, \vec{s}} \quad \textsc{TypSAHoleArg}$$

4 Algorithmic Syntax

$$\begin{array}{lll}
\text{Alg Types} \\
\widehat{A},\ \widehat{B},\ \widehat{C},\ \widehat{D} & ::= & 1 \mid \Pi x : \widehat{A}.\ \widehat{B} \mid \forall x : \widehat{A}.\ \widehat{B} \mid \widehat{e}_1 = \widehat{e}_2 : \widehat{A}
\end{array}$$

$$\begin{array}{lll}
\text{Alg Contexts} \\
\widehat{\Gamma} & ::= & \cdot \mid x : \widehat{A} \mid \widehat{\Gamma}_1, \widehat{\Gamma}_2
\end{array}$$

$$\begin{array}{lll}
\text{Alg Core Terms} \\
\widehat{e},\ \widehat{p} & ::= & x \mid \widehat{x} \mid <> \mid \lambda^\Pi x : \widehat{A}.\ \widehat{e} \mid \lambda^\forall x : \widehat{A}.\ \widehat{e} \mid \widehat{e}(\widehat{s}) \mid \mathbf{refl}\,\widehat{e} \mid \mathbf{subst}\,(p : \widehat{e}_1 = \widehat{e}_2 : \widehat{A}, x.\ \widehat{B}, \widehat{e})
\end{array}$$

$$\begin{array}{lll}
\text{Alg Core Spines} \\
\widehat{s} & ::= & \cdot \mid \widehat{e} \mid \{\widehat{e}\} \mid \widehat{s}_1, \widehat{s}_2
\end{array}$$

$$\begin{array}{lll}
\text{Alg Surface Terms} \\
\underline{\widehat{e}},\ \underline{\widehat{p}} & ::= & x \mid \widehat{x} \mid <> \mid \lambda^\Pi x : \widehat{A}.\ \underline{\widehat{e}} \mid \lambda^\forall x : \widehat{A}.\ \underline{\widehat{e}} \mid \underline{\widehat{e}}(\underline{\widehat{s}}) \mid \mathbf{refl}\,\underline{\widehat{e}} \mid \mathbf{subst}\,(p : \underline{\widehat{e}}_1 = \underline{\widehat{e}}_2 : \widehat{A}, x.\ \widehat{B}, \underline{\widehat{e}})
\end{array}$$

$$\begin{array}{lll}
\text{Alg Surface Spines} \\
\underline{\widehat{s}} & ::= & \cdot \mid \underline{\widehat{e}} \mid \{\underline{\widehat{e}}\} \mid \{\_\} \mid \underline{\widehat{s}}_1, \underline{\widehat{s}}_2
\end{array}$$

5 Surface to Algo

$$\boxed{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{e}} \Leftarrow \widehat{A} \rightsquigarrow \widehat{e} \dashv M\Gamma'}$$

$$\frac{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{e}} \Rightarrow \widehat{A} \rightsquigarrow \widehat{e} \dashv M\Gamma_1 \quad M\Gamma_1\,;\widehat{\Gamma} \vDash \widehat{A} \equiv \widehat{B} \dashv M\Gamma_2}{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{e}} \Leftarrow \widehat{B} \rightsquigarrow \widehat{e} \dashv M\Gamma_2} \quad \text{AlgCSwitch}$$

$$\boxed{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{e}} \Rightarrow \widehat{A} \rightsquigarrow \widehat{e} \dashv M\Gamma'}$$

$$\frac{x : \widehat{A} \in \widehat{\Gamma}}{M\Gamma\,;\widehat{\Gamma} \vDash x \Rightarrow \widehat{A} \rightsquigarrow x \dashv M\Gamma} \quad \text{AlgIVar}$$

$$\frac{}{M\Gamma\,;\widehat{\Gamma} \vDash <> \Rightarrow 1 \rightsquigarrow <> \dashv M\Gamma} \quad \text{AlgIUnit}$$

$$\frac{M\Gamma\,;\widehat{\Gamma}, x : \widehat{A} \vDash \underline{\widehat{e}} \Rightarrow \widehat{B} \rightsquigarrow \widehat{e} \dashv M\Gamma'}{M\Gamma\,;\widehat{\Gamma} \vDash \lambda^\Pi x : \widehat{A}.\ \underline{\widehat{e}} \Rightarrow \Pi x : \widehat{A}.\ \widehat{B} \rightsquigarrow \lambda^\Pi x : \widehat{A}.\ \widehat{e} \dashv M\Gamma'} \quad \text{AlgILam}$$

$$\frac{M\Gamma\,;\widehat{\Gamma}, x : \widehat{A} \vDash \underline{\widehat{e}} \Rightarrow \widehat{B} \rightsquigarrow \widehat{e} \dashv M\Gamma'}{M\Gamma\,;\widehat{\Gamma} \vDash \lambda^\forall x : \widehat{A}.\ \underline{\widehat{e}} \Rightarrow \forall x : \widehat{A}.\ \widehat{B} \rightsquigarrow \lambda^\forall x : \widehat{A}.\ \widehat{e} \dashv M\Gamma'} \quad \text{AlgIPLam}$$

$$\frac{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{e}} \Rightarrow \widehat{A} \rightsquigarrow \widehat{e} \dashv M\Gamma_1 \quad M\Gamma_1\,;\widehat{\Gamma} \vDash \underline{\widehat{s}} : \widehat{A} \gg \widehat{B} \rightsquigarrow \widehat{s} \dashv M\Gamma_2}{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{e}}(\underline{\widehat{s}}) \Rightarrow \widehat{B} \rightsquigarrow \widehat{e}(\widehat{s}) \dashv M\Gamma_2} \quad \text{AlgIApp}$$

$$\frac{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{e}} \Rightarrow \widehat{A} \rightsquigarrow \widehat{e} \dashv M\Gamma'}{M\Gamma\,;\widehat{\Gamma} \vDash \mathbf{refl}\,\underline{\widehat{e}} \Rightarrow \widehat{e} = \widehat{e} : \widehat{A} \rightsquigarrow \mathbf{refl}\,\widehat{e} \dashv M\Gamma'} \quad \text{AlgIRefl}$$

$$\boxed{M\Gamma\,;\widehat{\Gamma} \vDash \underline{\widehat{s}} : \widehat{A} \gg \widehat{B} \rightsquigarrow \widehat{s} \dashv M\Gamma'}$$

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$$\frac{}{M\Gamma\,;\widehat{\Gamma}\vDash\,\cdot:\widehat{A}\gg\widehat{A}\rightsquigarrow\,\cdot\dashv M\Gamma}\quad\textsc{AlgSAEmpty}$$

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$$\frac{\begin{array}{c}M\Gamma\,;\widehat{\Gamma}\vDash\Pi x:\widehat{B}.\,\widehat{A}\dashv M\Gamma_1\\ M\Gamma_1\,;\widehat{\Gamma}\vDash\widehat{e}\Leftarrow\widehat{B}\rightsquigarrow\widehat{e}\dashv M\Gamma_2\\ M\Gamma_2\,;\widehat{\Gamma}\vDash\underline{\widehat{s}}:[\widehat{e}/x]\widehat{A}\gg\widehat{C}\rightsquigarrow\widehat{\widehat{s}}\dashv M\Gamma_3\end{array}}{M\Gamma\,;\widehat{\Gamma}\vDash\widehat{e},\underline{\widehat{s}}:(\Pi x:\widehat{B}.\,\widehat{A})\gg\widehat{C}\rightsquigarrow\widehat{e},\widehat{\widehat{s}}\dashv M\Gamma_3}\quad\textsc{AlgSAArg}$$

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$$\frac{\begin{array}{c}M\Gamma\,;\widehat{\Gamma}\vDash\forall x:\widehat{B}.\,\widehat{A}\dashv M\Gamma_1\\ M\Gamma_1\,;\widehat{\Gamma}\vDash\widehat{e}\Leftarrow\widehat{B}\rightsquigarrow\widehat{e}\dashv M\Gamma_2\\ M\Gamma_2\,;\widehat{\Gamma}\vDash\underline{\widehat{s}}:[\widehat{e}/x]\widehat{A}\gg\widehat{C}\rightsquigarrow\widehat{\widehat{s}}\dashv M\Gamma_3\end{array}}{M\Gamma\,;\widehat{\Gamma}\vDash\{\widehat{e}\},\underline{\widehat{s}}:(\forall x:\widehat{B}.\,\widehat{A})\gg\widehat{C}\rightsquigarrow\{\widehat{e}\},\widehat{\widehat{s}}\dashv M\Gamma_3}\quad\textsc{AlgSAImpArg}$$

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$$\frac{M\Gamma\,;\widehat{\Gamma}\vDash\forall x:\widehat{B}.\,\widehat{A}\dashv M\Gamma_1\quad M\Gamma_1\,;\widehat{\Gamma}\vDash\underline{\widehat{s}}:[\widehat{x}/x]\widehat{A}\gg\widehat{C}\rightsquigarrow\widehat{\widehat{s}}\dashv M\Gamma_2}{M\Gamma\,;\widehat{\Gamma}\vDash\{\_\},\underline{\widehat{s}}:(\forall x:\widehat{B}.\,\widehat{A})\gg\widehat{C}\rightsquigarrow\{\widehat{x}\},\widehat{\widehat{s}}\dashv M\Gamma_2,(\widehat{\Gamma}\vdash ax\Leftarrow\widehat{B})}\quad\textsc{AlgSAHoleArg}$$

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$$\boxed{M\Gamma\,;\widehat{\Gamma}\vDash\widehat{A}\dashv M\Gamma'}$$

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$$\frac{}{M\Gamma\,;\widehat{\Gamma}\vDash 1\dashv M\Gamma}\quad\textsc{AlgWFUnit}$$

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$$\frac{M\Gamma\,;\widehat{\Gamma}\vDash\widehat{A}\dashv M\Gamma_1\quad M\Gamma_1\,;\widehat{\Gamma},x:\widehat{A}\vDash\widehat{B}\dashv M\Gamma_2}{M\Gamma\,;\widehat{\Gamma}\vDash\Pi x:\widehat{A}.\,\widehat{B}\dashv M\Gamma_2}\quad\textsc{AlgWFPi}$$

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$$\frac{M\Gamma\,;\widehat{\Gamma}\vDash\widehat{A}\dashv M\Gamma_1\quad M\Gamma_1\,;\widehat{\Gamma},x:\widehat{A}\vDash\widehat{B}\dashv M\Gamma_2}{M\Gamma\,;\widehat{\Gamma}\vDash\forall x:\widehat{A}.\,\widehat{B}\dashv M\Gamma_2}\quad\textsc{AlgWFForall}$$

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$$\frac{\begin{array}{c}M\Gamma\,;\widehat{\Gamma}\vDash\widehat{A}\dashv M\Gamma_1\\ M\Gamma_1\,;\widehat{\Gamma}\vDash\widehat{e_1}\Leftarrow\widehat{A}\rightsquigarrow\widehat{e_3}\dashv M\Gamma_2\quad M\Gamma_2\,;\widehat{\Gamma}\vDash\widehat{e_2}\Leftarrow\widehat{A}\rightsquigarrow\widehat{e_3}\dashv M\Gamma_3\end{array}}{M\Gamma\,;\widehat{\Gamma}\vDash\widehat{e_1}=\widehat{e_2}:\widehat{A}\dashv M\Gamma_3}\quad\textsc{AlgWFEq}$$

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