- Denotation for each typing relation derivation

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  - (Unit) $\dfrac{}{[\![\Gamma\vdash():\texttt{Unit}]\!]_M=[\![()]\!]_M\circ\langle\rangle_\Gamma:\Gamma\to[\![\texttt{Unit}]\!]_M}$

  - (Const) $\dfrac{}{[\![\Gamma\vdash\texttt{C}^A:A]\!]_M=[\![\texttt{C}^A]\!]_M\circ\langle\rangle_\Gamma:\Gamma\to[\![A]\!]_M}$

  - (True) $\dfrac{}{[\![\Gamma\vdash\texttt{true}:\texttt{Bool}]\!]_M=[\![\texttt{true}]\!]_M\circ\langle\rangle_\Gamma:\Gamma\to[\![\texttt{Bool}]\!]_M}$

  - (False) $\dfrac{}{[\![\Gamma\vdash\texttt{false}:\texttt{Bool}]\!]_M=[\![\texttt{false}]\!]_M\circ\langle\rangle_\Gamma:\Gamma\to[\![\texttt{Bool}]\!]_M}$

  - (Lambda) $\dfrac{f=[\![\Gamma,x:A]\!]_M C\mathsf{M}_\epsilon B:\Gamma\times A\to T_\epsilon B}{[\![\Gamma\vdash\lambda x{:}A.C{:}A\to\mathsf{M}_\epsilon B]\!]_M=\texttt{cur}(f):\Gamma\to(T_\epsilon B)^A}$

  - (Return) $\dfrac{f=[\![\Gamma\vdash v:A]\!]_M}{[\![\Gamma\vdash\texttt{return}\,v{:}\mathsf{M}_1 A]\!]_M=\eta_A\circ f}$

  - (Subtype) $\dfrac{f=[\![\Gamma\vdash v:A]\!]_M:\Gamma\to A\quad g=[\![A\leq:B]\!]_M}{[\![\Gamma\vdash v:B]\!]_M=g\circ f:\Gamma\to B}$

  - (Subeffect) $\dfrac{f=[\![\Gamma\vdash c:\mathsf{M}_{\epsilon_1} A]\!]_M:\Gamma\to T_{\epsilon_1} A\quad g=[\![A\leq:B]\!]_M\quad h=[\![\epsilon_1\leq\epsilon_2]\!]_M}{[\![\Gamma\vdash C:\mathsf{M}_{\epsilon_2} B]\!]_M=h_B\circ T_{\epsilon_1} g\circ f}$

  - (If) $\dfrac{f=[\![\Gamma\vdash v:\texttt{Bool}]\!]_M\quad g=[\![\Gamma\vdash C_1:\mathsf{M}_\epsilon A]\!]_M\quad h=[\![\Gamma\vdash C_2:\mathsf{M}_\epsilon A]\!]_M}{[\![\Gamma\vdash\texttt{if}_{\epsilon,A}\,v\,\texttt{then}\,C_1\,\texttt{else}\,C_2{:}\mathsf{M}_\epsilon A]\!]_M=\texttt{if}_{\epsilon,A}\circ\langle f,\langle g,h\rangle\rangle:\Gamma\to T_\epsilon A}$

  - (Bind) $\dfrac{f=[\![\Gamma\vdash C_1{:}\mathsf{M}_{\epsilon_1} A:\Gamma\to T_{\epsilon_1} A\quad g=[\![\Gamma,x{:}A\vdash C_2{:}\mathsf{M}_{\epsilon_2} B]\!]_M]\!]_M:\Gamma\times A\to T_{\epsilon_2} B}{[\![\Gamma\vdash\texttt{do}\,x\!\leftarrow\!C_1\,\texttt{in}\,C_2{:}\mathsf{M}_{\epsilon_1\cdot\epsilon_2}]\!]_M=\mu_{\epsilon_1,\epsilon_2,B}\circ T_{\epsilon_1} g\circ\texttt{t}_{\Gamma,A,\epsilon_1}\circ\langle\texttt{Id}_\Gamma,f\rangle:\Gamma\to T_{\epsilon_1\cdot\epsilon_2} B}$

- Denotations of Types

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  - **Fill in from book**
  - For each ground type $g\in\gamma$
  - morphism $[\![A\leq:B]\!]_M:[\![A]\!]_M\to[\![B]\!]_M$ for each $A\leq:B$
  - Natural Transformation $[\![\epsilon_1\leq\epsilon_2]\!]_M:T_{\epsilon_1}\to T_{\epsilon_2}$ for each $\epsilon_1\leq\epsilon_2$