$$
\begin{aligned}
i &\in \mathbf{Int} \\
b &\in \mathbf{Bool} \\
x, y &\in \mathbf{Var} \\
op &\in \mathbf{Prim} &::=&\ +\mid -\mid *\mid < \\
\tau &\in \mathbf{Types} &::=&\ \texttt{bool}\mid \texttt{int}\mid \tau \to \tau \mid \tau\ \texttt{list} \\
\Gamma &\in \mathbf{Env} &::=&\ \bullet \mid \Gamma, x : \tau \\
e &\in \mathbf{Exp} &::=&\ i\mid b\mid x\mid e\ op\ e\mid \texttt{if}\ e\ \texttt{then}\ e\ \texttt{else}\ e\mid \texttt{let}\ x = e\ \texttt{in}\ e \\
&&&\mid \texttt{fun}\ x \to e\mid \texttt{let rec}\ x = \texttt{fun}\ y \to e\ \texttt{in}\ e \\
&&&\mid [\,]\mid e :: e\mid \texttt{match}\ e\ \texttt{with}\ [\,] \to e\mid x :: y \to e
\end{aligned}
$$

$$\frac{}{\Gamma \vdash i : \mathtt{int}} \ (\text{T-I{\scriptsize NT}}) \qquad \frac{}{\Gamma \vdash b : \mathtt{bool}} \ (\text{T-B{\scriptsize OOL}}) \qquad \frac{(\Gamma(x) = \tau)}{\Gamma \vdash x : \tau} \ (\text{T-V{\scriptsize AR}})$$

$$\frac{\Gamma \vdash e_1 : \mathtt{bool} \qquad \Gamma \vdash e_2 : \tau \qquad \Gamma \vdash e_3 : \tau}{\Gamma \vdash \mathtt{if}\ e_1\ \mathtt{then}\ e_2\ \mathtt{else}\ e_3 : \tau} \ (\text{T-I{\scriptsize F}})$$

$$\frac{\Gamma \vdash e_1 : \mathtt{int} \qquad \Gamma \vdash e_2 : \mathtt{int}}{\Gamma \vdash e_1 + e_2 : \mathtt{int}} \ (\text{T-P{\scriptsize LUS}}) \qquad \frac{\Gamma \vdash e_1 : \mathtt{int} \qquad \Gamma \vdash e_2 : \mathtt{int}}{\Gamma \vdash e_1 - e_2 : \mathtt{int}} \ (\text{T-M{\scriptsize INUS}})$$

$$\frac{\Gamma \vdash e_1 : \mathtt{int} \qquad \Gamma \vdash e_2 : \mathtt{int}}{\Gamma \vdash e_1 * e_2 : \mathtt{int}} \ (\text{T-T{\scriptsize IMES}}) \qquad \frac{\Gamma \vdash e_1 : \mathtt{int} \qquad \Gamma \vdash e_2 : \mathtt{int}}{\Gamma \vdash e_1 < e_2 : \mathtt{bool}} \ (\text{T-L{\scriptsize T}})$$

$$\frac{\Gamma, x : \tau_1 \vdash e : \tau_2}{\Gamma \vdash \mathtt{fun}\ x \to e : \tau_1 \to \tau_2} \ (\text{T-F{\scriptsize UN}}) \qquad \frac{\Gamma \vdash e_1 : \tau_1 \to \tau_2 \qquad \Gamma \vdash e_2 : \tau_1}{\Gamma \vdash e_1\ e_2 : \tau_2} \ (\text{T-A{\scriptsize PP}})$$

$$\frac{\Gamma \vdash e_1 : \tau_1 \qquad \Gamma, x : \tau_1 \vdash e_2 : \tau_2}{\Gamma \vdash \mathtt{let}\ x = e_1\ \mathtt{in}\ e_2 : \tau_2} \ (\text{T-L{\scriptsize ET}}) \qquad \frac{\Gamma, x : \tau_1 \to \tau_2, y : \tau_1 \vdash e_1 : \tau_2 \qquad \Gamma, x : \tau_1 \to \tau_2 \vdash e_2 : \tau}{\Gamma \vdash \mathtt{let}\ \mathtt{rec}\ x = \mathtt{fun}\ y \to e_1\ \mathtt{in}\ e_2 : \tau} \ (\text{T-L{\scriptsize ET}R{\scriptsize EC}})$$

$$\frac{}{\Gamma \vdash [] : \tau\ \mathtt{list}} \ (\text{T-N{\scriptsize IL}}) \qquad \frac{\Gamma \vdash e_1 : \tau \qquad \Gamma \vdash e_2 : \tau\ \mathtt{list}}{\Gamma \vdash e_1 :: e_2 : \tau\ \mathtt{list}} \ (\text{T-C{\scriptsize ONS}})$$

$$\frac{\Gamma \vdash e_1 : \tau'\ \mathtt{list} \qquad \Gamma \vdash e_2 : \tau \qquad \Gamma, x : \tau', y : \tau'\ \mathtt{list} \vdash e_3 : \tau}{\Gamma \vdash \mathtt{match}\ e_1\ \mathtt{with}\ [] \to e_2\ |\ x :: y \to e_3 : \tau} \ (\text{T-M{\scriptsize ATCH}})$$