$value\_name, x$
$ident$
$integer\_literal$
$index, i, j, n, m$

$typeconstr$	::=		
	|	**unit**	
	|	**bool**	
	|	**int**	
$typvar,\ tv$	::=		
	|	$'\, ident$	
$typexpr,\ t$	::=		
	|	$typvar$	
	|	$typexpr \rightarrow typexpr'$	
	|	$typeconstr$	
	|	$(\, typexpr\,)$	S
$typscheme,\ ts$	::=		
	|	$(\, typvar_1\, ,\, ..,\, typvar_n\,)\, typexpr$	bind $typvar_1 .. typvar_n$ in $typexpr$
	|	**generalise** $(\, \Gamma\, ,\, t\,)$	M
$constant,\ c$	::=		
	|	$integer\_literal$	
	|	**false**	
	|	**true**	
	|	()	
	|	(&&)	
	|	**not**	
$expr,\ e$	::=		
	|	$value\_name$	
	|	$constant$	
	|	$expr\ expr'$	
	|	**function** $value\_name \rightarrow expr$	bind $value\_name$ in $expr$
	|	**let** $value\_name = expr$ **in** $expr'$	bind $value\_name$ in $expr'$
	|	$(\, expr\,)$	S
	|	$\{\, v\, /\, x\, \}\, e$	M
$value,\ v$	::=		
	|	$constant$	
	|	**function** $value\_name \rightarrow expr$	
Γ	::=		
	|	**empty**	
	|	$\Gamma\, ,\, value\_name : typscheme$	
$formula$	::=		
	|	$judgement$	
	|	**not** $(\, formula\,)$	
	|	$typscheme > t$	

$$
\begin{array}{lll}
 & | & typscheme \ = \ typscheme' \\
 & | & value\_name \ = \ value\_name' \\
 & & \\
terminals & ::= & \\
 & | & \rightarrow \\
 & | & \mathbf{function} \\
 & | & \vdash \\
 & | & \longrightarrow \\
 & | & \{ \\
 & | & \} \\
 & & \\
Jtype & ::= & \\
 & | & value\_name \ : \ typscheme \, \mathbf{in} \, \Gamma \\
 & | & \Gamma \vdash \ constant \ : \ t \\
 & | & \Gamma \vdash \ e \ : \ t \\
 & & \\
Jop & ::= & \\
 & | & e \ \longrightarrow \ e' \\
 & & \\
judgement & ::= & \\
 & | & Jtype \\
 & | & Jop \\
 & & \\
user\_syntax & ::= & \\
 & | & value\_name \\
 & | & ident \\
 & | & integer\_literal \\
 & | & index \\
 & | & typeconstr \\
 & | & typvar \\
 & | & typexpr \\
 & | & typscheme \\
 & | & constant \\
 & | & expr \\
 & | & value \\
 & | & \Gamma \\
 & | & formula \\
 & | & terminals
\end{array}
$$

$\boxed{value\_name \ : \ typscheme \, \mathbf{in} \, \Gamma}$

$$
\frac{}{value\_name \ : \ typscheme \, \mathbf{in} \, \Gamma \, , \, value\_name \ : \ typscheme} \quad \textsc{VTSin\_vn1}
$$

$$
\frac{\begin{array}{l} value\_name \ : \ typscheme \, \mathbf{in} \, \Gamma \\ \mathbf{not} \, (\, value\_name \ = \ value\_name' \,) \end{array}}{value\_name \ : \ typscheme \, \mathbf{in} \, \Gamma \, , \, value\_name' \ : \ typscheme'} \quad \textsc{VTSin\_vn2}
$$

$\boxed{\Gamma \vdash \ constant \ : \ t}$

$$
\frac{}{\Gamma \vdash \ integer\_literal \ : \ \mathbf{int}} \quad \textsc{constant\_int}
$$

$$
\frac{}{\Gamma \vdash \ \mathbf{false} \ : \ \mathbf{bool}} \quad \textsc{constant\_false}
$$

$$\frac{}{\Gamma \vdash \mathbf{true} \,:\, \mathbf{bool}} \quad \text{CONSTANT\_TRUE}$$

$$\frac{}{\Gamma \vdash () \,:\, \mathbf{unit}} \quad \text{CONSTANT\_UNIT}$$

$$\frac{}{\Gamma \vdash (\&\&) \,:\, \mathbf{bool} \to (\mathbf{bool} \to \mathbf{bool})} \quad \text{CONSTANT\_AND}$$

$$\frac{}{\Gamma \vdash \mathbf{not} \,:\, \mathbf{bool} \to \mathbf{bool}} \quad \text{CONSTANT\_NOT}$$

$\boxed{\Gamma \vdash e \,:\, t}$

$$\frac{\begin{array}{l} x \,:\, \mathit{typscheme}\, \mathbf{in}\, \Gamma \\ \mathit{typscheme} \,>\, t \end{array}}{\Gamma \vdash x \,:\, t} \quad \text{GET\_VALUE\_NAME}$$

$$\frac{\Gamma \vdash \mathit{constant} \,:\, t}{\Gamma \vdash \mathit{constant} \,:\, t} \quad \text{GET\_CONSTANT}$$

$$\frac{\begin{array}{l} \Gamma \vdash e \,:\, t_1 \to t_2 \\ \Gamma \vdash e' \,:\, t_1 \end{array}}{\Gamma \vdash e\, e' \,:\, t_2} \quad \text{GET\_APPLY}$$

$$\frac{\Gamma, x_1 \,:\, (\;)\, t_1 \vdash e \,:\, t}{\Gamma \vdash \mathbf{function}\, x_1 \to e \,:\, t_1 \to t} \quad \text{GET\_LAMBDA}$$

$$\frac{\begin{array}{l} \Gamma \vdash e \,:\, t \\ \Gamma, x \,:\, \mathit{typscheme} \vdash e' \,:\, t' \\ \mathit{typscheme} = \mathbf{generalise}\,(\Gamma, t) \end{array}}{\Gamma \vdash \mathbf{let}\, x = e\, \mathbf{in}\, e' \,:\, t'} \quad \text{GET\_LET}$$

$\boxed{e \longrightarrow e'}$

$$\frac{}{(\mathbf{function}\, x \to e)\, v \longrightarrow \{ v / x \}\, e} \quad \text{JO\_RED\_APP}$$

$$\frac{}{\mathbf{let}\, x = v\, \mathbf{in}\, e \longrightarrow \{ v / x \}\, e} \quad \text{JO\_RED\_LET}$$

$$\frac{e \longrightarrow e'}{e\, e_1 \longrightarrow e'\, e_1} \quad \text{JO\_RED\_CONTEXT\_APP1}$$

$$\frac{e \longrightarrow e'}{v\, e \longrightarrow v\, e'} \quad \text{JO\_RED\_CONTEXT\_APP2}$$

$$\frac{e \longrightarrow e'}{\mathbf{let}\, x = e\, \mathbf{in}\, e_1 \longrightarrow \mathbf{let}\, x = e'\, \mathbf{in}\, e_1} \quad \text{JO\_RED\_CONTEXT\_LET}$$

$$\frac{}{\mathbf{not}\, \mathbf{true} \longrightarrow \mathbf{false}} \quad \text{JO\_RED\_NOT\_1}$$

$$\frac{}{\mathbf{not}\, \mathbf{false} \longrightarrow \mathbf{true}} \quad \text{JO\_RED\_NOT\_2}$$

$$\frac{}{((\&\&)\, \mathbf{true})\, e \longrightarrow e} \quad \text{JO\_RED\_AND\_1}$$

$$\frac{}{((\&\&)\, \mathbf{false})\, e \longrightarrow \mathbf{false}} \quad \text{JO\_RED\_AND\_2}$$

```
Definition rules:        22 good    0 bad
Definition rule clauses: 36 good    0 bad
```