Parametric polymorphism

```
id :: a -> a
id x = x
```

```
len :: [a] -> Int
len []       = 0
len (x:xs) = len xs + 1
```

```
(++) :: [a] -> [a] -> [a]
[]     ++ ys = ys
(x:xs) ++ ys = x:(xs ++ ys)
```

HASKELL-classes and instances

$$
\begin{array}{lcl}
\underline{\text{topdecl}} & \rightarrow & \dots \\
& | & \texttt{class}\ \underline{\text{tyconstr}}\ \underline{\text{var}}\ [\texttt{where}\ \{\underline{\text{cdecl}}_1 ; \dots ; \underline{\text{cdecl}}_n\}], \quad n \geq 1 \\
& | & \texttt{instance}\ \underline{\text{tyconstr}}\ \underline{\text{instype}}\ [\texttt{where}\ \{\underline{\text{cdecl}}_1 ; \dots ; \underline{\text{cdecl}}_n\}]
\end{array}
$$

$$
\begin{array}{lcl}
\underline{\text{cdecl}} & \rightarrow & \underline{\text{typedecl}} \mid \underline{\text{fundecl}} \mid \underline{\text{infixdecl}} \mid \underline{\text{var}}\ \underline{\text{rhs}}
\end{array}
$$

$$
\begin{array}{lcl}
\underline{\text{instype}} & \rightarrow & (\underline{\text{tyconstr}}\ \underline{\text{var}}_1 \dots \underline{\text{var}}_n), \quad n \geq 0 \\
& | & [\underline{\text{var}}] \\
& | & (\underline{\text{var}}_1 \rightarrow \underline{\text{var}}_2) \\
& | & (\underline{\text{var}}_1, \dots, \underline{\text{var}}_n), \quad n \geq 2
\end{array}
$$

$$
\begin{array}{lcl}
\underline{\text{idecl}} & \rightarrow & \underline{\text{fundecl}} \mid \underline{\text{var}}\ \underline{\text{rhs}}
\end{array}
$$

HASKELL-contexts

$$\underline{\text{context}} \;\rightarrow\; (\underline{\text{tyconstr}}_1\, \underline{\text{var}}_1, \ldots, \underline{\text{tyconstr}}_n\, \underline{\text{var}}_n), \qquad n \geq 1$$

$$\underline{\text{typedecl}} \;\rightarrow\; \underline{\text{var}}_1, \ldots, \underline{\text{var}}_n \;::\; [\underline{\text{context}} \Rightarrow]\; \underline{\text{type}}, \qquad n \geq 1$$

$$\begin{array}{lll}
\underline{\text{topdecl}} \;\rightarrow & \ldots & \\
& |\; \texttt{data}\; [\underline{\text{context}} \Rightarrow]\; \underline{\text{tyconstr}}\; \underline{\text{var}}_1 \;\ldots\; \underline{\text{var}}_n \;= & \\
& \qquad \underline{\text{constr}}_1\; \underline{\text{type}}_{1,1} \ldots \underline{\text{type}}_{1,n_1} \;| & \\
& \qquad \vdots & \\
& \qquad \underline{\text{constr}}_k\; \underline{\text{type}}_{k,1} \ldots \underline{\text{type}}_{k,n_k}, & n \geq 0, k \geq 1, n_i \geq 0 \\
& & \\
& |\; \texttt{class}\; [\underline{\text{context}} \Rightarrow]\; \underline{\text{tyconstr}}\; \underline{\text{var}}\; [\texttt{where}\; \{\underline{\text{cdecl}}_1; \ldots; \underline{\text{cdecl}}_n\}] & \\
& & \\
& |\; \texttt{instance}\; [\underline{\text{context}} \Rightarrow]\; \underline{\text{tyconstr}}\; \underline{\text{instype}} & \\
& \qquad\qquad [\texttt{where}\; \{\underline{\text{cdecl}}_1; \ldots; \underline{\text{cdecl}}_n\}] &
\end{array}$$