The example with even and odd

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1 The example with even and odd

First we define types for truth values and natural numbers. We then define the two mutually recursive functions *even* and *odd*.

$$Bool \in Set$$
$$Bool \equiv \mathbf{data} \left\{ \begin{array}{l} \mathbf{False} \\ \mathbf{True} \end{array} \right\}$$

$$Nat \in Set$$
$$Nat \equiv \mathbf{data} \left\{ \begin{array}{l} \mathbf{Zero} \\ \mathbf{Succ}\,(n \in Nat) \end{array} \right\}$$

$$even \in (a \in Nat) \rightarrow Bool$$
$$even \equiv \lambda\, a \rightarrow \mathbf{case}\ a\ \mathbf{of} \left\{ \begin{array}{l} \mathbf{Zero} \rightarrow \mathbf{True} \\ \mathbf{Succ}\, n \rightarrow odd\, n \end{array} \right\}$$

$$odd \in (a \in Nat) \rightarrow Bool$$
$$odd \equiv \lambda\, a \rightarrow \mathbf{case}\ a\ \mathbf{of} \left\{ \begin{array}{l} \mathbf{Zero} \rightarrow \mathbf{False} \\ \mathbf{Succ}\, n \rightarrow even\, n \end{array} \right\}$$