

# Type inference

25 August 2023 16:18

- Add 2 number
- Type Inference:

$$\begin{array}{c}
 \frac{\Gamma(x) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [10] \quad \Gamma(y) = \text{Int} \quad [11] \quad \Gamma(z) = \text{Int} \quad [12]}{\Gamma(+) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [13]} \\
 \frac{\Gamma(+) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [13] \quad \Gamma(x) = \text{Int} \quad [11] \quad \Gamma(y) = \text{Int} \quad [12]}{\Gamma(\text{return}(+)) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [14]} \\
 \frac{\Gamma(\text{return}(+)) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [14] \quad \Gamma(x) = \text{Int} \quad [11] \quad \Gamma(y) = \text{Int} \quad [12]}{\Gamma(\text{return}(+(x, y))) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [15]} \\
 \frac{\Gamma(\text{return}(+(x, y))) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [15] \quad \Gamma(x) = \text{Int} \quad [11] \quad \Gamma(y) = \text{Int} \quad [12]}{\Gamma(\text{let } x = \text{return}(+(x, y)) \text{ in } \dots) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [16]} \\
 \frac{\Gamma(\text{let } x = \text{return}(+(x, y)) \text{ in } \dots) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [16] \quad \Gamma(\text{let } x = \text{return}(+(x, y)) \text{ in } \dots) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [17]}{\Gamma(\text{let } x = \text{return}(+(x, y)) \text{ in } \dots) = \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} \quad [18]}
 \end{array}$$

let add =  $\lambda x \lambda y \text{return}(+(x, y))$  in  $(::) \text{ n } (\text{add } 12) : a_0$

- Type Constraints:

$$\begin{array}{llll}
 1: a_0 \approx a_{14} & 2: a_1 \approx a_3 \rightarrow a_4 & 3: a_5 \approx d_x & 4: a_4 \approx a_5 \rightarrow a_6 \\
 5: a_5 \approx d_y & 6: a_7 \approx a_9 \rightarrow a_6 & 7: a_2 \approx a_7 \rightarrow a_8 & 8: a_{10} \approx a_{11} \rightarrow a_9 \\
 9: a_{11} \approx a_{12} \rightarrow a_{10} & 10: a_{11} \approx \text{Int} \rightarrow \text{Int} \rightarrow \text{Int} & 11: a_{12} \approx d_x & 12: a_{13} \approx d_y \\
 13: a_{15} \approx a_{19} \rightarrow a_{14} & 14: a_{16} \approx a_{17} \rightarrow a_{15} & 15: a_{16} \approx a_{17} \rightarrow \text{Unit} & 16: a_{17} \approx d_n \\
 17: a_{20} \approx a_{23} \rightarrow a_{19} & 18: a_1 \approx a_{22} \rightarrow a_{20} & 19: a_{22} \approx \text{Int} & 20: a_{23} \approx \text{Int}
 \end{array}$$