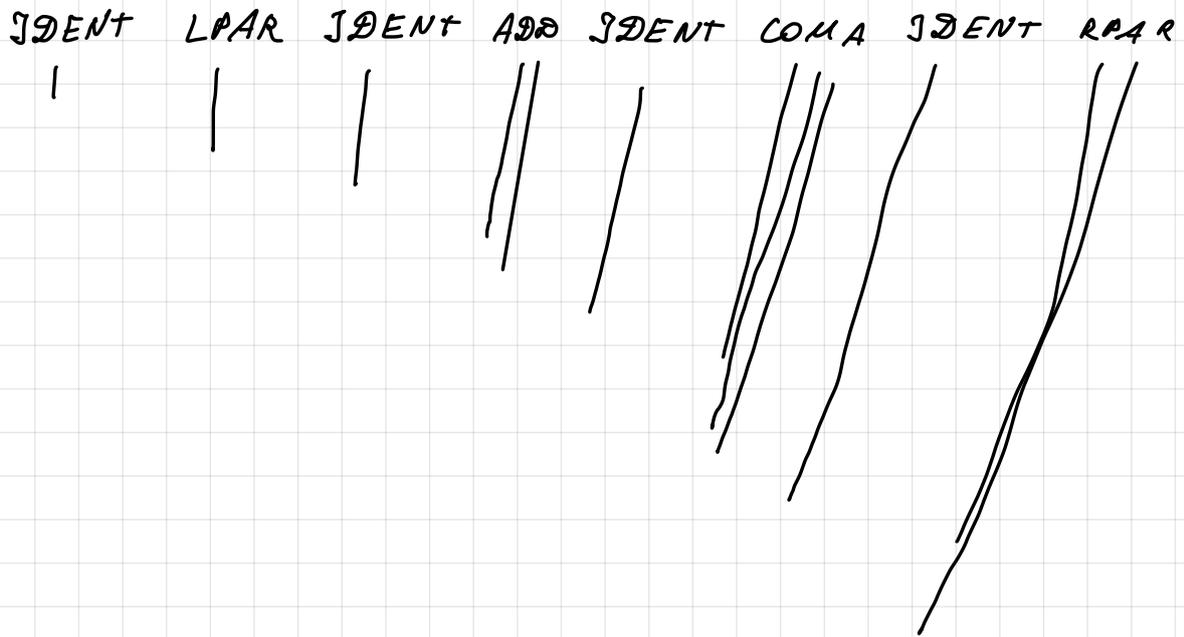




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4.

$$\frac{\Gamma(c) = \bar{t}}{\Gamma \vdash c : T_1} \quad \frac{\Gamma(\text{leaf}) = \text{mt} \rightarrow \text{bfree} \quad \Gamma \vdash e : T_2}{\Gamma \vdash \text{leaf}(n) \rightarrow e : T_1 \rightarrow T_2} \quad (x) \quad \frac{\Gamma \vdash \text{Node}(t_1, L_2) \rightarrow \text{Node}(t_2, \epsilon I) : T_1 \rightarrow T_2}{\Gamma \vdash \text{match } c \text{ with } \text{leaf}(n) \rightarrow e \mid \text{Node}(t_1, L_2) \rightarrow \text{Node}(t_2, \epsilon I) : T_2}$$

$$(x) = \frac{\Gamma(\text{Node}) = \text{bfree} \times \text{bfree} \rightarrow \text{bfree} \quad \Gamma \vdash t_2 : \text{bfree} \quad \Gamma \vdash t_1 : \text{bfree}}{\Gamma \vdash \text{Node}(t_2, t_1) : T_2}$$