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1 exType Theory

Built: 06 February 2020

Parent Theories: indexedLists, patternMatches

1.1 Definitions

[APP_def]

$$\vdash (\forall l. \text{APP } [] \ l = l) \wedge \forall h \ l_1 \ l_2. \text{APP } (h::l_1) \ l_2 = h::\text{APP } l_1 \ l_2$$

[Map_def]

$$\vdash (\forall f. \text{Map } f \ [] = []) \wedge \forall f \ h \ l_1. \text{Map } f \ (h::l_1) = f \ h::\text{Map } f \ l_1$$

1.2 Theorems

[APP_ASSOC]

$$\vdash \forall l_1 \ l_2 \ l_3. \text{APP } (\text{APP } l_1 \ l_2) \ l_3 = \text{APP } l_1 \ (\text{APP } l_2 \ l_3)$$

[LENGTH_APP]

$$\vdash \forall l_1 \ l_2. \text{LENGTH } (\text{APP } l_1 \ l_2) = \text{LENGTH } l_1 + \text{LENGTH } l_2$$

[Map_APP]

$$\vdash \text{Map } f \ (\text{APP } l_1 \ l_2) = \text{APP } (\text{Map } f \ l_1) \ (\text{Map } f \ l_2)$$

2 nexp Theory

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Parent Theories: indexedLists, patternMatches

2.1 Datatypes

$$\text{nexp} = \text{Num } \text{num} \mid \text{Add } \text{nexp } \text{nexp} \mid \text{Sub } \text{nexp } \text{nexp} \mid \text{Mult } \text{nexp } \text{nexp}$$

2.2 Definitions

[nexpVal_def]

$$\begin{aligned} \vdash & (\forall \text{num}. \text{nexpVal } (\text{Num } \text{num}) = \text{num}) \wedge \\ & (\forall f_1 \ f_2. \text{nexpVal } (\text{Add } f_1 \ f_2) = \text{nexpVal } f_1 + \text{nexpVal } f_2) \wedge \\ & (\forall f_1 \ f_2. \text{nexpVal } (\text{Sub } f_1 \ f_2) = \text{nexpVal } f_1 - \text{nexpVal } f_2) \wedge \\ & \forall f_1 \ f_2. \text{nexpVal } (\text{Mult } f_1 \ f_2) = \text{nexpVal } f_1 \times \text{nexpVal } f_2 \end{aligned}$$

2.3 Theorems

[Add_0]

$\vdash \forall f. \text{nexpVal } (\text{Add } (\text{Num } 0) f) = \text{nexpVal } f$

[Add_SYM]

$\vdash \forall f_1 f_2. \text{nexpVal } (\text{Add } f_1 f_2) = \text{nexpVal } (\text{Add } f_2 f_1)$

[Mult_ASSOC]

$\vdash \forall f_1 f_2 f_3. \\ \text{nexpVal } (\text{Mult } f_1 (\text{Mult } f_2 f_3)) = \\ \text{nexpVal } (\text{Mult } (\text{Mult } f_1 f_2) f_3)$

[Sub_0]

$\vdash \forall f. \\ (\text{nexpVal } (\text{Sub } (\text{Num } 0) f) = 0) \wedge \\ (\text{nexpVal } (\text{Sub } f (\text{Num } 0)) = \text{nexpVal } f)$

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