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1 exType Theory

Built: 10 August 2019

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]

$$\vdash (\forall f. \text{Map } f \ [] = []) \wedge \forall f \ x \ f_1. \text{Map } f \ (x::f_1) = f \ x::\text{Map } f \ f_1$$

1.2 Theorems

[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

Built: 10 August 2019

Parent Theories: indexedLists, patternMatches

2.1 Datatypes

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

2.2 Definitions

[nexpVal_def]

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

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]

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

[nexp_distinct_clauses]

$$\begin{aligned} \vdash & (\forall a_1 a_0 a. \text{Num } a \neq \text{Add } a_0 a_1) \wedge \\ & (\forall a_1 a_0 a. \text{Num } a \neq \text{Sub } a_0 a_1) \wedge \\ & (\forall a_1 a_0 a. \text{Num } a \neq \text{Mult } a_0 a_1) \wedge \\ & (\forall a'_1 a_1 a'_0 a_0. \text{Add } a_0 a_1 \neq \text{Sub } a'_0 a'_1) \wedge \\ & (\forall a'_1 a_1 a'_0 a_0. \text{Add } a_0 a_1 \neq \text{Mult } a'_0 a'_1) \wedge \\ & \forall a'_1 a_1 a'_0 a_0. \text{Sub } a_0 a_1 \neq \text{Mult } a'_0 a'_1 \end{aligned}$$

[nexp_one_one]

$$\begin{aligned} \vdash & (\forall a a'. (\text{Num } a = \text{Num } a') \iff (a = a')) \wedge \\ & (\forall a_0 a_1 a'_0 a'_1. \\ & \quad (\text{Add } a_0 a_1 = \text{Add } a'_0 a'_1) \iff (a_0 = a'_0) \wedge (a_1 = a'_1)) \wedge \\ & (\forall a_0 a_1 a'_0 a'_1. \\ & \quad (\text{Sub } a_0 a_1 = \text{Sub } a'_0 a'_1) \iff (a_0 = a'_0) \wedge (a_1 = a'_1)) \wedge \\ & \forall a_0 a_1 a'_0 a'_1. \\ & \quad (\text{Mult } a_0 a_1 = \text{Mult } a'_0 a'_1) \iff (a_0 = a'_0) \wedge (a_1 = a'_1) \end{aligned}$$

[Sub_0]

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

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