

t29\_functor3 (TMJB-  
whdwK1kyEXQ2QhaWQM5tRg7U4Lq6BoM)

October 27, 2020

Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v2\_altcat\_1 : \iota \Rightarrow o$  be given. Let  $v11\_altcat\_1 : \iota \Rightarrow o$  be given. Let  $v12\_altcat\_1 : \iota \Rightarrow o$  be given. Let  $l2\_altcat\_1 : \iota \Rightarrow o$  be given. Let  $v15\_functor0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $m2\_functor0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $m2\_functor2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r2\_functor2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k6\_functor3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_functor3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $m1\_functor2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r1\_functor2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r8\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k7\_functor3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_functor2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $v1\_relat\_1 : \iota \Rightarrow o$  be given. Let  $v4\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_partfun1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_functor2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l1\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_altcat\_1 : \iota \Rightarrow o$  be given. Let  $v9\_functor0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_altcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_xboole\_0 : \iota$  be given. Let  $k5\_altcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_functor0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k6\_functor0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_functor2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0. ((\neg v2\_struct\_0 X0) \wedge ((v2\_altcat\_1 X0) \wedge ((v12\_altcat\_1 \\
 & X0) \wedge (l2\_altcat\_1 X0)))) \Rightarrow (\forall X1. ((\neg v2\_struct\_0 X1) \wedge ((v2\_altcat\_1 \\
 & X1) \wedge ((v12\_altcat\_1 X1) \wedge (l2\_altcat\_1 X1)))) \Rightarrow (\forall X2. ((v15\_functor0 \\
 & X2 X0 X1) \wedge (m2\_functor0 X2 X0 X1)) \Rightarrow (r2\_functor2 X0 X1 X2 X2)))
 \end{aligned}
 \tag{1}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v2\_altcat\_1 X0) \wedge ((v12\_altcat\_1 \\
& X0) \wedge (l2\_altcat\_1 X0)))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge ((v2\_altcat\_1 \\
& X1) \wedge ((v12\_altcat\_1 X1) \wedge (l2\_altcat\_1 X1)))) \Rightarrow (\forall X2.((\neg \\
& v2\_struct\_0 X2) \wedge ((v2\_altcat\_1 X2) \wedge ((v12\_altcat\_1 X2) \wedge (l2\_altcat\_1 \\
& X2)))) \Rightarrow (\forall X3.((v15\_functor0 X3 X0 X1) \wedge (m2\_functor0 X3 X0 \\
& X1)) \Rightarrow (\forall X4.((v15\_functor0 X4 X1 X2) \wedge (m2\_functor0 X4 X1 X2)) \Rightarrow \\
& (\forall X5.((v15\_functor0 X5 X1 X2) \wedge (m2\_functor0 X5 X1 X2)) \Rightarrow ( \\
& \forall X6.(m1\_functor2 X6 X1 X2 X4 X5) \Rightarrow ((r1\_functor2 X1 X2 X4 X5) \Rightarrow \\
& (r8\_pboole (u1\_struct\_0 X0) (k6\_functor3 X0 X1 X2 X4 X5 X3 X6) (k7\_functor3 \\
& X0 X1 X2 X3 X3 X4 X5 (k4\_functor2 X0 X1 X3) X6))))))))) \\
& \tag{2}
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.((\neg v1\_xboole\_0 X0) \wedge (((v1\_relat\_1 \\
& X1) \wedge ((v4\_relat\_1 X1 X0) \wedge ((v1\_funct\_1 X1) \wedge (v1\_partfun1 X1 X0)))) \wedge \\
& ((v1\_relat\_1 X2) \wedge ((v4\_relat\_1 X2 X0) \wedge ((v1\_funct\_1 X2) \wedge (v1\_partfun1 \\
& X2 X0)))))) \Rightarrow ((r8\_pboole X0 X1 X2) \Leftrightarrow (X1 = X2)) \\
& \tag{3}
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0) \wedge ((v2\_altcat\_1 \\
& X0) \wedge ((v12\_altcat\_1 X0) \wedge (l2\_altcat\_1 X0)))) \wedge (((\neg v2\_struct\_0 \\
& X1) \wedge ((v2\_altcat\_1 X1) \wedge ((v12\_altcat\_1 X1) \wedge (l2\_altcat\_1 X1)))) \wedge \\
& ((v15\_functor0 X2 X0 X1) \wedge (m2\_functor0 X2 X0 X1))) \Rightarrow (k4\_functor2 \\
& X0 X1 X2 = k1\_functor2 X0 X1 X2) \\
& \tag{4}
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v2\_altcat\_1 X0) \wedge ((v11\_altcat\_1 \\
& X0) \wedge ((v12\_altcat\_1 X0) \wedge (l2\_altcat\_1 X0)))) \Rightarrow (\forall X1.(( \\
& \neg v2\_struct\_0 X1) \wedge ((v2\_altcat\_1 X1) \wedge ((v11\_altcat\_1 X1) \wedge ((v12\_altcat\_1 \\
& X1) \wedge (l2\_altcat\_1 X1)))) \Rightarrow (\forall X2.((\neg v2\_struct\_0 X2) \wedge (( \\
& v2\_altcat\_1 X2) \wedge ((v11\_altcat\_1 X2) \wedge ((v12\_altcat\_1 X2) \wedge (l2\_altcat\_1 \\
& X2)))) \Rightarrow (\forall X3.((v15\_functor0 X3 X0 X1) \wedge (m2\_functor0 X3 \\
& X0 X1)) \Rightarrow (\forall X4.((v15\_functor0 X4 X0 X1) \wedge (m2\_functor0 X4 X0 \\
& X1)) \Rightarrow (\forall X5.((v15\_functor0 X5 X1 X2) \wedge (m2\_functor0 X5 X1 X2)) \Rightarrow \\
& (\forall X6.((v15\_functor0 X6 X1 X2) \wedge (m2\_functor0 X6 X1 X2)) \Rightarrow ( \\
& \forall X7.(m2\_functor2 X7 X1 X2 X5 X6) \Rightarrow (\forall X8.(m2\_functor2 \\
& X8 X0 X1 X3 X4) \Rightarrow (((r2\_functor2 X0 X1 X3 X4) \wedge (r2\_functor2 X1 X2 X5 X6)) \Rightarrow \\
& ((r2\_functor2 X0 X2 (k1\_functor3 X0 X1 X2 X3 X5) (k1\_functor3 X0 X1 \\
& X2 X4 X6)) \wedge (m2\_functor2 (k7\_functor3 X0 X1 X2 X3 X4 X5 X6 X8 X7) X0 X2 \\
& (k1\_functor3 X0 X1 X2 X3 X5) (k1\_functor3 X0 X1 X2 X4 X6))))))))))))) \\
& \tag{5}
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge (l1\_struct\_0 X0)) \Rightarrow (\neg v1\_xboole\_0 \\
& (u1\_struct\_0 X0)) \\
& \tag{6}
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. \forall X2. \forall X3. (((\neg v2\_struct\_0 \\
& X0) \wedge ((v2\_altcat\_1 X0) \wedge ((v12\_altcat\_1 X0) \wedge (l2\_altcat\_1 X0)))) \wedge \\
& (((\neg v2\_struct\_0 X1) \wedge ((v2\_altcat\_1 X1) \wedge ((v12\_altcat\_1 X1) \wedge (l2\_altcat\_1 X1)))) \wedge \\
& ((v15\_functor0 X2 X0 X1) \wedge (m2\_functor0 X2 \\
& X0 X1)) \wedge ((v15\_functor0 X3 X0 X1) \wedge (m2\_functor0 X3 X0 X1)))) \Rightarrow (\forall X4. \\
& (m2\_functor2 X4 X0 X1 X2 X3) \Rightarrow (m1\_functor2 X4 X0 X1 X2 X3))
\end{aligned} \tag{7}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. \forall X2. \forall X3. (((\neg v2\_struct\_0 \\
& X0) \wedge ((v2\_altcat\_1 X0) \wedge ((v12\_altcat\_1 X0) \wedge (l2\_altcat\_1 X0)))) \wedge \\
& (((\neg v2\_struct\_0 X1) \wedge ((v2\_altcat\_1 X1) \wedge ((v12\_altcat\_1 X1) \wedge (l2\_altcat\_1 X1)))) \wedge \\
& ((m2\_functor0 X2 X0 X1) \wedge (m2\_functor0 X3 X0 \\
& X1))) \Rightarrow (\forall X4. (m1\_functor2 X4 X0 X1 X2 X3) \Rightarrow ((v1\_relat\_1 X4) \wedge \\
& ((v4\_relat\_1 X4 (u1\_struct\_0 X0)) \wedge ((v1\_funct\_1 X4) \wedge (v1\_partfun1 \\
& X4 (u1\_struct\_0 X0))))))
\end{aligned} \tag{8}$$

Assume the following.

$$\forall X0. (l2\_altcat\_1 X0) \Rightarrow (l1\_altcat\_1 X0) \tag{9}$$

Assume the following.

$$\forall X0. (l1\_altcat\_1 X0) \Rightarrow (l1\_struct\_0 X0) \tag{10}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. \forall X5. \\
& \forall X6. \forall X7. \forall X8. (((\neg v2\_struct\_0 X0) \wedge ((v2\_altcat\_1 \\
& X0) \wedge ((v12\_altcat\_1 X0) \wedge (l2\_altcat\_1 X0)))) \wedge (((\neg v2\_struct\_0 \\
& X1) \wedge ((v2\_altcat\_1 X1) \wedge ((v12\_altcat\_1 X1) \wedge (l2\_altcat\_1 X1)))) \wedge \\
& (((\neg v2\_struct\_0 X2) \wedge ((v2\_altcat\_1 X2) \wedge ((v12\_altcat\_1 X2) \wedge (l2\_altcat\_1 X2)))) \wedge \\
& ((v15\_functor0 X3 X0 X1) \wedge (m2\_functor0 X3 \\
& X0 X1)) \wedge ((v15\_functor0 X4 X0 X1) \wedge (m2\_functor0 X4 X0 X1)) \wedge ((v15\_functor0 \\
& X5 X1 X2) \wedge (m2\_functor0 X5 X1 X2)) \wedge ((v15\_functor0 X6 X1 X2) \wedge (m2\_functor0 \\
& X6 X1 X2)) \wedge ((m1\_functor2 X7 X0 X1 X3 X4) \wedge (m1\_functor2 X8 X1 X2 X5 X6)))))) \Rightarrow \\
& (m1\_functor2 (k7\_functor3 X0 X1 X2 X3 X4 X5 X6 X7 X8) X0 X2 (k1\_functor3 \\
& X0 X1 X2 X3 X5) (k1\_functor3 X0 X1 X2 X4 X6))
\end{aligned} \tag{11}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.\forall X5. \\
& \quad \forall X6.(((\neg v2\_struct\_0 X0)\wedge((v2\_altcat\_1 X0)\wedge((v12\_altcat\_1 \\
& \quad X0)\wedge(l2\_altcat\_1 X0))))\wedge(((\neg v2\_struct\_0 X1)\wedge((v2\_altcat\_1 \\
& \quad X1)\wedge((v12\_altcat\_1 X1)\wedge(l2\_altcat\_1 X1))))\wedge(((\neg v2\_struct\_0 \\
& \quad X2)\wedge((v2\_altcat\_1 X2)\wedge((v12\_altcat\_1 X2)\wedge(l2\_altcat\_1 X2))))\wedge \\
& \quad ((v15\_functor0 X3 X1 X2)\wedge(m2\_functor0 X3 X1 X2))\wedge((v15\_functor0 \\
& \quad X4 X1 X2)\wedge(m2\_functor0 X4 X1 X2))\wedge(((v15\_functor0 X5 X0 X1)\wedge(m2\_functor0 \\
& \quad X5 X0 X1))\wedge(m1\_functor2 X6 X1 X2 X3 X4))))\Rightarrow(m1\_functor2 (k6\_functor3 \\
& \quad X0 X1 X2 X3 X4 X5 X6) X0 X2 (k1\_functor3 X0 X1 X2 X5 X3) (k1\_functor3 X0 \\
& \quad X1 X2 X5 X4))
\end{aligned} \tag{12}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0)\wedge((v2\_altcat\_1 \\
& \quad X0)\wedge((v12\_altcat\_1 X0)\wedge(l2\_altcat\_1 X0))))\wedge(((\neg v2\_struct\_0 \\
& \quad X1)\wedge((v2\_altcat\_1 X1)\wedge((v12\_altcat\_1 X1)\wedge(l2\_altcat\_1 X1))))\wedge \\
& \quad ((v15\_functor0 X2 X0 X1)\wedge(m2\_functor0 X2 X0 X1)))\Rightarrow(m2\_functor2 \\
& \quad (k4\_functor2 X0 X1 X2) X0 X1 X2 X2)
\end{aligned} \tag{13}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.(((\neg v2\_struct\_0 \\
& \quad X0)\wedge((v2\_altcat\_1 X0)\wedge((v12\_altcat\_1 X0)\wedge(l2\_altcat\_1 X0))))\wedge \\
& \quad (((\neg v2\_struct\_0 X1)\wedge((v2\_altcat\_1 X1)\wedge((v12\_altcat\_1 X1)\wedge \\
& \quad l2\_altcat\_1 X1))))\wedge(((\neg v2\_struct\_0 X2)\wedge((v12\_altcat\_1 X2)\wedge \\
& \quad (l2\_altcat\_1 X2))))\wedge(((v15\_functor0 X3 X0 X1)\wedge(m2\_functor0 X3 \\
& \quad X0 X1))\wedge((v15\_functor0 X4 X1 X2)\wedge(m2\_functor0 X4 X1 X2))))\Rightarrow( \\
& \quad (v9\_functor0 (k1\_functor3 X0 X1 X2 X3 X4) X0 X2)\wedge((v15\_functor0 \\
& \quad (k1\_functor3 X0 X1 X2 X3 X4) X0 X2)\wedge(m2\_functor0 (k1\_functor3 X0 \\
& \quad X1 X2 X3 X4) X0 X2)))
\end{aligned} \tag{14}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0)\wedge((v2\_altcat\_1 \\
& \quad X0)\wedge((v12\_altcat\_1 X0)\wedge(l2\_altcat\_1 X0))))\wedge(((\neg v2\_struct\_0 \\
& \quad X1)\wedge((v2\_altcat\_1 X1)\wedge((v12\_altcat\_1 X1)\wedge(l2\_altcat\_1 X1))))\wedge \\
& \quad (m2\_functor0 X2 X0 X1))\Rightarrow(m1\_functor2 (k1\_functor2 X0 X1 X2) X0 \\
& \quad X1 X2 X2)
\end{aligned} \tag{15}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v2\_altcat\_1 X0) \wedge ((v12\_altcat\_1 \\
& X0) \wedge (l2\_altcat\_1 X0)))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge ((v2\_altcat\_1 \\
& X1) \wedge ((v12\_altcat\_1 X1) \wedge (l2\_altcat\_1 X1)))) \Rightarrow (\forall X2.((v15\_functor0 \\
& X2 X0 X1) \wedge (m2\_functor0 X2 X0 X1)) \Rightarrow (\forall X3.((v15\_functor0 X3 \\
& X0 X1) \wedge (m2\_functor0 X3 X0 X1)) \Rightarrow ((r2\_functor2 X0 X1 X2 X3) \Leftrightarrow ((r1\_functor2 \\
& X0 X1 X2 X3) \wedge (\exists X4.(m1\_functor2 X4 X0 X1 X2 X3) \wedge (\forall X5. \\
& (m1\_subset\_1 X5 (u1\_struct\_0 X0)) \Rightarrow (\forall X6.(m1\_subset\_1 X6 \\
& (u1\_struct\_0 X0)) \Rightarrow ((k1\_altcat\_1 X0 X5 X6 \neq k1\_xboole\_0) \Rightarrow (\forall X7. \\
& (m1\_subset\_1 X7 (k1\_altcat\_1 X0 X5 X6)) \Rightarrow (k5\_altcat\_1 X1 (k3\_functor0 \\
& X0 X1 X2 X5) (k3\_functor0 X0 X1 X2 X6) (k3\_functor0 X0 X1 X3 X6) (k6\_functor0 \\
& X0 X1 X2 X5 X6 X7) (k2\_functor2 X0 X1 X2 X3 X4 X6) = k5\_altcat\_1 X1 (k3\_functor0 \\
& X0 X1 X2 X5) (k3\_functor0 X0 X1 X3 X5) (k3\_functor0 X0 X1 X3 X6) (k2\_functor2 \\
& X0 X1 X2 X3 X4 X5) (k6\_functor0 X0 X1 X3 X5 X6 X7)))))))))) \\
& \hspace{15em} (16)
\end{aligned}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v2\_altcat\_1 X0) \wedge ((v11\_altcat\_1 \\
& X0) \wedge ((v12\_altcat\_1 X0) \wedge (l2\_altcat\_1 X0)))) \Rightarrow (\forall X1.((\neg \\
& v2\_struct\_0 X1) \wedge ((v2\_altcat\_1 X1) \wedge ((v11\_altcat\_1 X1) \wedge ((v12\_altcat\_1 \\
& X1) \wedge (l2\_altcat\_1 X1)))) \Rightarrow (\forall X2.((\neg v2\_struct\_0 X2) \wedge (( \\
& v2\_altcat\_1 X2) \wedge ((v11\_altcat\_1 X2) \wedge ((v12\_altcat\_1 X2) \wedge (l2\_altcat\_1 \\
& X2)))) \Rightarrow (\forall X3.((v15\_functor0 X3 X0 X1) \wedge (m2\_functor0 X3 \\
& X0 X1)) \Rightarrow (\forall X4.((v15\_functor0 X4 X1 X2) \wedge (m2\_functor0 X4 X1 \\
& X2)) \Rightarrow (\forall X5.((v15\_functor0 X5 X1 X2) \wedge (m2\_functor0 X5 X1 X2)) \Rightarrow \\
& (\forall X6.(m2\_functor2 X6 X1 X2 X4 X5) \Rightarrow ((r2\_functor2 X1 X2 X4 X5) \Rightarrow \\
& (m2\_functor2 (k6\_functor3 X0 X1 X2 X4 X5 X3 X6) X0 X2 (k1\_functor3 \\
& X0 X1 X2 X3 X4) (k1\_functor3 X0 X1 X2 X3 X5))))))))))
\end{aligned}$$