

t42\_bcialg\_3 (TMFBmuMRXqVuhWzt-  
fJde8wVK4vzxMeZ6TpQ)

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Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v3\_bcialg\_1 : \iota \Rightarrow o$  be given. Let  $v4\_bcialg\_1 : \iota \Rightarrow o$  be given. Let  $v5\_bcialg\_1 : \iota \Rightarrow o$  be given. Let  $v7\_bcialg\_1 : \iota \Rightarrow o$  be given. Let  $v8\_bcialg\_1 : \iota \Rightarrow o$  be given. Let  $l2\_bcialg\_1 : \iota \Rightarrow o$  be given. Let  $v11\_bcialg\_3 : \iota \Rightarrow o$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k1\_bcialg\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_bcialg\_3 : \iota \Rightarrow o$  be given. Let  $v10\_bcialg\_3 : \iota \Rightarrow o$  be given. Let  $r1\_bcialg\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $l1\_bcialg\_1 : \iota \Rightarrow o$  be given. Let  $l2\_struct\_0 : \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned}
& \forall X0. (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 \\
& X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge \\
& (l2\_bcialg\_1 X0)))))) \Rightarrow (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge \\
& ((v4\_bcialg\_1 X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 \\
& X0) \wedge ((v1\_bcialg\_3 X0) \wedge (l2\_bcialg\_1 X0))))))))) \Leftrightarrow (\forall X1. \\
& (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2. (m1\_subset\_1 X2 \\
& (u1\_struct\_0 X0)) \Rightarrow (k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 X0 X1 X2) = k1\_bcialg\_1 \\
& X0 X2 (k1\_bcialg\_1 X0 X2 (k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 X0 X1 X2))))))
\end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
& \forall X0. (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 \\
& X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge \\
& (l2\_bcialg\_1 X0)))))) \Rightarrow (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge \\
& ((v4\_bcialg\_1 X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 \\
& X0) \wedge ((v11\_bcialg\_3 X0) \wedge (l2\_bcialg\_1 X0))))))))) \Leftrightarrow (((\neg v2\_struct\_0 \\
& X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 X0) \wedge ((v5\_bcialg\_1 X0) \wedge \\
& ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge ((v1\_bcialg\_3 X0) \wedge (l2\_bcialg\_1 \\
& X0))))))))) \wedge (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 \\
& X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge \\
& ((v10\_bcialg\_3 X0) \wedge (l2\_bcialg\_1 X0)))))))))
\end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 \\
& X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge \\
& (l2\_bcialg\_1 X0)))))) \Rightarrow (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge \\
& ((v4\_bcialg\_1 X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 \\
& X0) \wedge ((v10\_bcialg\_3 X0) \wedge (l2\_bcialg\_1 X0)))))) \Leftrightarrow (\forall X1. \\
& (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 \\
& (u1\_struct\_0 X0)) \Rightarrow (r1\_bcialg\_1 X0 (k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 \\
& X0 X1 (k1\_bcialg\_1 X0 X2 (k1\_bcialg\_1 X0 X2 X1)))) (k1\_bcialg\_1 X0 \\
& (k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 X0 X1 X2)) (k1\_bcialg\_1 X0 X2 X1))))))
\end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 \\
& X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge \\
& (l2\_bcialg\_1 X0)))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow ((r1\_bcialg\_1 \\
& X0 (k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 X0 X1 X2)) X2) \wedge (r1\_bcialg\_1 X0 \\
& (k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 X0 X1 X2)) X1))))
\end{aligned} \tag{4}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 \\
& X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge \\
& (l2\_bcialg\_1 X0)))))) \Rightarrow (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge \\
& ((v4\_bcialg\_1 X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 \\
& X0) \wedge ((v10\_bcialg\_3 X0) \wedge (l2\_bcialg\_1 X0)))))) \Leftrightarrow (\forall X1. \\
& (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 \\
& (u1\_struct\_0 X0)) \Rightarrow (k1\_bcialg\_1 X0 (k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 \\
& X0 X1 X2)) (k1\_bcialg\_1 X0 X2 X1) = k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 \\
& X0 X1 (k1\_bcialg\_1 X0 X2 (k1\_bcialg\_1 X0 X2 X1))))))
\end{aligned} \tag{5}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge ((v4\_bcialg\_1 \\
& X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 X0) \wedge \\
& (l2\_bcialg\_1 X0)))))) \Rightarrow (((\neg v2\_struct\_0 X0) \wedge ((v3\_bcialg\_1 X0) \wedge \\
& ((v4\_bcialg\_1 X0) \wedge ((v5\_bcialg\_1 X0) \wedge ((v7\_bcialg\_1 X0) \wedge ((v8\_bcialg\_1 \\
& X0) \wedge ((v10\_bcialg\_3 X0) \wedge (l2\_bcialg\_1 X0)))))) \Rightarrow (\forall X1. \\
& (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 \\
& (u1\_struct\_0 X0)) \Rightarrow ((k1\_bcialg\_1 X0 X1 (k1\_bcialg\_1 X0 X2 (k1\_bcialg\_1 \\
& X0 X2 X1)) = k1\_bcialg\_1 X0 X1 X2) \wedge (k1\_bcialg\_1 X0 (k1\_bcialg\_1 X0 \\
& X1 X2) (k1\_bcialg\_1 X0 (k1\_bcialg\_1 X0 X1 X2) X1) = k1\_bcialg\_1 X0 \\
& X1 X2))))
\end{aligned} \tag{6}$$

Assume the following.

$$\forall X0.(l2\_bcialg\_1 X0) \Rightarrow ((l1\_bcialg\_1 X0) \wedge (l2\_struct\_0 X0)) \tag{7}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. ((l1\_bialg\_1 X0) \wedge ((m1\_subset\_1 \\ & X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (u1\_struct\_0 X0)))) \Rightarrow (m1\_subset\_1 \\ & (k1\_bialg\_1 X0 X1 X2) (u1\_struct\_0 X0)) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge (l2\_bialg\_1 X0)) \Rightarrow ((v1\_bialg\_3 \\ & X0) \Leftrightarrow (\forall X1. (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2. \\ & (m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (k1\_bialg\_1 X0 X1 (k1\_bialg\_1 \\ & X0 X1 X2) = k1\_bialg\_1 X0 X2 (k1\_bialg\_1 X0 X2 X1)))))) \end{aligned} \quad (9)$$

**Theorem 1**

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge ((v3\_bialg\_1 X0) \wedge ((v4\_bialg\_1 \\ & X0) \wedge ((v5\_bialg\_1 X0) \wedge ((v7\_bialg\_1 X0) \wedge ((v8\_bialg\_1 X0) \wedge \\ & (l2\_bialg\_1 X0))))))) \Rightarrow (((\neg v2\_struct\_0 X0) \wedge ((v3\_bialg\_1 X0) \wedge \\ & ((v4\_bialg\_1 X0) \wedge ((v5\_bialg\_1 X0) \wedge ((v7\_bialg\_1 X0) \wedge ((v8\_bialg\_1 \\ & X0) \wedge ((v11\_bialg\_3 X0) \wedge (l2\_bialg\_1 X0))))))) \Leftrightarrow (\forall X1. \\ & (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2. (m1\_subset\_1 X2 \\ & (u1\_struct\_0 X0)) \Rightarrow (k1\_bialg\_1 X0 X1 (k1\_bialg\_1 X0 X1 X2) = k1\_bialg\_1 \\ & X0 (k1\_bialg\_1 X0 X2 (k1\_bialg\_1 X0 X2 X1)) (k1\_bialg\_1 X0 X1 X2)))))) \end{aligned}$$