

thm\_2Ebinary\_ieee\_2Eflags\_accessors  
(TMJNsRBofdzw4NpyV6GjheagG2YzZXZmv7)

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**Definition 1** We define `c_2Emin_2E_3D_3D_3E` to be  $\lambda P \in 2.\lambda Q \in 2.inj\_o (p \Rightarrow P \Rightarrow Q)$  of type  $\iota$ .

**Definition 2** We define `c_2Emin_2E_3D` to be  $\lambda A.\lambda x \in A.\lambda y \in A.inj\_o (x = y)$  of type  $\iota \Rightarrow \iota$ .

**Definition 3** We define `c_2Ebool_2E_2T` to be  $(ap (ap (c_2Emin_2E_3D (2^2)) (\lambda V0x \in 2.V0x)) (\lambda V1x \in 2.V1x))$

**Definition 4** We define `c_2Ebool_2E_21` to be  $\lambda A_{27a} : \iota.(\lambda V0P \in (2^{A-27a}).(ap (ap (c_2Emin_2E_3D (2^{A-27a})) (\lambda V1t \in 2.V1t)) (\lambda V2t \in 2.V2t))$

**Definition 5** We define `c_2Ebool_2E_2F_5C` to be  $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_2Ebool_2E_21 2) (\lambda V2t \in 2.V2t)) (\lambda V3t \in 2.V3t))$

Let `ty_2Ebinary_ieee_2Eflags` :  $\iota$  be given. Assume the following.

$$nonempty \ ty\_2Ebinary\_ieee\_2Eflags \tag{1}$$

Let `c_2Ebinary_ieee_2Eflags_DivideByZero` :  $\iota$  be given. Assume the following.

$$c\_2Ebinary\_ieee\_2Eflags\_DivideByZero \in (2^{ty\_2Ebinary\_ieee\_2Eflags}) \tag{2}$$

Let `c_2Ebinary_ieee_2Eflags_InvalidOp` :  $\iota$  be given. Assume the following.

$$c\_2Ebinary\_ieee\_2Eflags\_InvalidOp \in (2^{ty\_2Ebinary\_ieee\_2Eflags}) \tag{3}$$

Let `c_2Ebinary_ieee_2Eflags_Overflow` :  $\iota$  be given. Assume the following.

$$c\_2Ebinary\_ieee\_2Eflags\_Overflow \in (2^{ty\_2Ebinary\_ieee\_2Eflags}) \tag{4}$$

Let `c_2Ebinary_ieee_2Eflags_Precision` :  $\iota$  be given. Assume the following.

$$c\_2Ebinary\_ieee\_2Eflags\_Precision \in (2^{ty\_2Ebinary\_ieee\_2Eflags}) \tag{5}$$

Let `c_2Ebinary_ieee_2Eflags_Underflow_BeforeRounding` :  $\iota$  be given. Assume the following.

$$c\_2Ebinary\_ieee\_2Eflags\_Underflow\_BeforeRounding \in (2^{ty\_2Ebinary\_ieee\_2Eflags}) \tag{6}$$

Let  $c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags : \iota$  be given. Assume the following.

$$c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \in ((((((ty\_2Ebinary\_ieee\_2Eflags^2)^2)^2)^2)^2)^2) \quad (7)$$

Let  $c\_2Ebinary\_ieee\_2Eflags\_Underflow\_AfterRounding : \iota$  be given. Assume the following.

$$c\_2Ebinary\_ieee\_2Eflags\_Underflow\_AfterRounding \in (2^{ty\_2Ebinary\_ieee\_2Eflags}) \quad (8)$$

Assume the following.

$$\begin{aligned} & (\forall V0b \in 2. (\forall V1b0 \in 2. (\forall V2b1 \in 2. (\forall V3b2 \in \\ & 2. (\forall V4b3 \in 2. (\forall V5b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_DivideByZero \\ & (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\ & V0b) V1b0) V2b1) V3b2) V4b3) V5b4))) \Leftrightarrow (p V0b))))))))) \end{aligned} \quad (9)$$

Assume the following.

$$\begin{aligned} & (\forall V0b \in 2. (\forall V1b0 \in 2. (\forall V2b1 \in 2. (\forall V3b2 \in \\ & 2. (\forall V4b3 \in 2. (\forall V5b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_InvalidOp \\ & (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\ & V0b) V1b0) V2b1) V3b2) V4b3) V5b4))) \Leftrightarrow (p V1b0))))))))) \end{aligned} \quad (10)$$

Assume the following.

$$\begin{aligned} & (\forall V0b \in 2. (\forall V1b0 \in 2. (\forall V2b1 \in 2. (\forall V3b2 \in \\ & 2. (\forall V4b3 \in 2. (\forall V5b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Overflow \\ & (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\ & V0b) V1b0) V2b1) V3b2) V4b3) V5b4))) \Leftrightarrow (p V2b1))))))))) \end{aligned} \quad (11)$$

Assume the following.

$$\begin{aligned} & (\forall V0b \in 2. (\forall V1b0 \in 2. (\forall V2b1 \in 2. (\forall V3b2 \in \\ & 2. (\forall V4b3 \in 2. (\forall V5b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Precision \\ & (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\ & V0b) V1b0) V2b1) V3b2) V4b3) V5b4))) \Leftrightarrow (p V3b2))))))))) \end{aligned} \quad (12)$$

Assume the following.

$$\begin{aligned} & (\forall V0b \in 2. (\forall V1b0 \in 2. (\forall V2b1 \in 2. (\forall V3b2 \in \\ & 2. (\forall V4b3 \in 2. (\forall V5b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Underflow\_BeforeRounding \\ & (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\ & V0b) V1b0) V2b1) V3b2) V4b3) V5b4))) \Leftrightarrow (p V4b3))))))))) \end{aligned} \quad (13)$$

Assume the following.

$$\begin{aligned}
& (\forall V0b \in 2. (\forall V1b0 \in 2. (\forall V2b1 \in 2. (\forall V3b2 \in \\
& 2. (\forall V4b3 \in 2. (\forall V5b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Underflow\_AfterRounding \\
& (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\
& V0b) V1b0) V2b1) V3b2) V4b3) V5b4))) \Leftrightarrow (p V5b4))))))))) \\
& \hspace{10em} (14)
\end{aligned}$$

**Theorem 1**

$$\begin{aligned}
& ((\forall V0b \in 2. (\forall V1b0 \in 2. (\forall V2b1 \in 2. (\forall V3b2 \in \\
& 2. (\forall V4b3 \in 2. (\forall V5b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_DivideByZero \\
& (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\
& V0b) V1b0) V2b1) V3b2) V4b3) V5b4))) \Leftrightarrow (p V0b))))))))) \wedge ((\forall V6b \in \\
& 2. (\forall V7b0 \in 2. (\forall V8b1 \in 2. (\forall V9b2 \in 2. (\forall V10b3 \in \\
& 2. (\forall V11b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_InvalidOp \\
& (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\
& V6b) V7b0) V8b1) V9b2) V10b3) V11b4))) \Leftrightarrow (p V7b0))))))))) \wedge ((\forall V12b \in \\
& 2. (\forall V13b0 \in 2. (\forall V14b1 \in 2. (\forall V15b2 \in 2. ( \\
& \forall V16b3 \in 2. (\forall V17b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Overflow \\
& (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\
& V12b) V13b0) V14b1) V15b2) V16b3) V17b4))) \Leftrightarrow (p V14b1))))))))) \wedge ( \\
& (\forall V18b \in 2. (\forall V19b0 \in 2. (\forall V20b1 \in 2. (\forall V21b2 \in \\
& 2. (\forall V22b3 \in 2. (\forall V23b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Precision \\
& (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\
& V18b) V19b0) V20b1) V21b2) V22b3) V23b4))) \Leftrightarrow (p V21b2))))))))) \wedge ( \\
& (\forall V24b \in 2. (\forall V25b0 \in 2. (\forall V26b1 \in 2. (\forall V27b2 \in \\
& 2. (\forall V28b3 \in 2. (\forall V29b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Underflow\_BeforeRounding \\
& (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\
& V24b) V25b0) V26b1) V27b2) V28b3) V29b4))) \Leftrightarrow (p V28b3))))))))) \wedge ( \\
& \forall V30b \in 2. (\forall V31b0 \in 2. (\forall V32b1 \in 2. (\forall V33b2 \in \\
& 2. (\forall V34b3 \in 2. (\forall V35b4 \in 2. ((p (ap c\_2Ebinary\_ieee\_2Eflags\_Underflow\_AfterRounding \\
& (ap (ap (ap (ap (ap (ap c\_2Ebinary\_ieee\_2Erecordtype\_2Eflags \\
& V30b) V31b0) V32b1) V33b2) V34b3) V35b4))) \Leftrightarrow (p V35b4)))))))))
\end{aligned}$$