

Proof

function

$$\text{first}(x) \cap \text{first}(y)$$

$$\{\$ \} \cap [\text{first}(\text{assnmt}) \cup \text{first}(\text{ifstart}) \cup \text{first}(\text{loop}) \cup \text{first}(\text{read}) \cup \text{first}(\text{output}) \cup \text{first}(\text{forall})]$$

$$= \{\$ \} \cap \{\text{I}, \text{w}, \text{R}, \text{O}, \text{C}, \text{X}, \text{Y}, \text{Z}\}$$

$$= \emptyset$$

Statement

$$\text{first}(a), \text{first}(b), \text{first}(c), \text{first}(d), \text{first}(e), \text{first}(f)$$

$$\text{first}(\text{assnmt}), \text{first}(\text{ifstart}), \text{first}(\text{loop}), \text{first}(\text{read}), \text{first}(\text{output}), \text{first}(\text{forall})$$

PAIRWISE DISJOINT

\emptyset

Assnmt - Trivial

Ifstart

$$\text{first}(a) \cap \text{first}(b)$$

$$\text{first}(\text{statement}) \cap \{\%, \&\} = \{\text{I}, \text{w}, \text{R}, \text{O}, \text{C}, \text{X}, \text{Y}, \text{Z}\} \cap \{\%, \&\}$$

$$= \emptyset$$

$$\text{first}(w) \cap \text{first}(x)$$

$$\text{first}(\text{statement}) \cap \{\&\}$$

$$\{\text{I}, \text{w}, \text{R}, \text{O}, \text{C}, \text{X}, \text{Y}, \text{Z}\} \cap \{\&\} = \emptyset$$

$$\text{first}(y) \cap \text{first}(z)$$

$$= \{\&\} \cap \{\%, \&\}$$

$$= \emptyset$$

Loop

$$\text{first}(a) \cap \text{first}(b)$$

$$\{\text{T}\} \cap \text{first}(\text{statement})$$

$$\{\text{T}\} \cap \{\text{I}, \text{w}, \text{R}, \text{O}, \text{C}, \text{X}, \text{Y}, \text{Z}\}$$

$$= \emptyset$$

Read

$$\text{first}(a) \cap \text{first}(b)$$

$$\{\text{I}\} \cap \{\text{I}\}$$

$$\emptyset$$

Output

$$\text{first}(a) \cap \text{first}(b)$$

$$\{\text{I}\} \cap \{\text{I}\}$$

$$\emptyset$$

Proofs

funcall
Trivial

Comprsn
Trivial

Exprsn

$$\begin{aligned} & \text{first}(a) \cap \text{first}(b) \\ & \text{follow}(\text{exprsn}) \cap \{+\} \\ & = \{ \cdot \} \cap \{+\} \\ & = \emptyset \end{aligned}$$

Factor

$$\begin{aligned} & \text{first}(a) \cap \text{first}(b) \\ & \text{follow}(\text{factor}) \cap \{*\} \\ & = \{ \} \cap \{*\} \\ & = \emptyset \end{aligned}$$

Opnd

$$\begin{aligned} & \text{first}(a) \cap \text{first}(b) \cap \text{first}(c) \\ & \text{first}(\text{integer}) \cap \text{first}(\text{idnt}) \cap \{ \} \\ & = \{0, 1, 2, 3, 4, 5, 6, 7\} \cap \{x, y, z\} \cap \{ \} \\ & = \emptyset \end{aligned}$$

Opndr
Trivial

idnt

$$\begin{aligned} & \text{first}(a) \cap \text{first}(b) \\ & \text{first}(\text{char}) \\ & = \{x, y, z, 0, 1, 2, 3, 4, 5, 6, 7\} \\ & = \emptyset \end{aligned}$$

char

$$\begin{aligned} & \text{first}(a) \cap \text{first}(b) \\ & \text{first}(\text{letters}) \cap \text{first}(\text{digit}) \\ & \{x, y, z\} \cap \{0, 1, 2, 3, 4, 5, 6, 7\} \\ & = \emptyset \\ & \text{Pairwise disjoint} \end{aligned}$$

integer

Base (digit)

{0, 1, 2, 3, 4, 5, 6, 7}

~~8~~

letter

Trivial

digit

Trivial