

Ejercicio: colección canónica de LR(0)-elementos

Gramática que genera expresiones aritméticas

$P = \{$

$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow (E)$

$E \rightarrow \text{id}$

$E \rightarrow n$

$\}$

Gramática ampliada

$P' = \{$

$E' \rightarrow E$

$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow (E)$

$E \rightarrow \text{id}$

$E \rightarrow n$

$\}$

$I_0 = \text{clausura}(\{ E' \rightarrow \bullet E \})$

$= \{ E' \rightarrow \bullet E ,$

$E \rightarrow \bullet E + E , E \rightarrow \bullet E * E , E \rightarrow \bullet (E) , E \rightarrow \bullet \text{id} , E \rightarrow \bullet n \}$

$\text{Ir}_a(I_0, E) = \text{clausura}(\{ E' \rightarrow E \bullet , E \rightarrow E \bullet + E , E \rightarrow E \bullet * E \})$

$= \{ E' \rightarrow E \bullet , E \rightarrow E \bullet + E , E \rightarrow E \bullet * E \}$

$= I_1$

$\text{Ir}_a(I_0, "(") = \text{clausura} \{ E \rightarrow (\bullet E) \}$

$= \{ E \rightarrow (\bullet E) ,$

$E \rightarrow \bullet E + E , E \rightarrow \bullet E * E , E \rightarrow \bullet (E) , E \rightarrow \bullet \text{id} , E \rightarrow \bullet n \}$

$= I_2$

$\text{Ir}_a(I_0, \text{id}) = \text{clausura}(\{ E \rightarrow \text{id} \bullet \}) = \{ E \rightarrow \text{id} \bullet \}$

$= I_3$

$\text{Ir}_a(I_0, n) = \text{clausura}(\{ E \rightarrow n \bullet \}) = \{ E \rightarrow n \bullet \}$

$= I_4$

$\text{Ir}_a(I_1, +) = \text{clausura}(\{ E \rightarrow E + \bullet E \})$

$= \{ E \rightarrow E + \bullet E ,$

$E \rightarrow \bullet E + E , E \rightarrow \bullet E * E , E \rightarrow \bullet (E) , E \rightarrow \bullet \text{id} , E \rightarrow \bullet n \}$

$= I_5$

$\text{Ir}_a(I_1, *) = \text{clausura} (\{ E \rightarrow E * \bullet E \})$

$$\begin{aligned}
&= \{ E \rightarrow E * \bullet E, \\
&\quad E \rightarrow \bullet E + E, E \rightarrow \bullet E * E, E \rightarrow \bullet (E), E \rightarrow \bullet id, E \rightarrow \bullet n \} \\
&= I6
\end{aligned}$$

$$\begin{aligned}
Ir_a(I2, E) &= \text{clausura}(\{ E \rightarrow (E \bullet), E \rightarrow E \bullet + E, E \rightarrow E \bullet * E \}) \\
&= \{ E \rightarrow (E \bullet), E \rightarrow E \bullet + E, E \rightarrow E \bullet * E \} \\
&= I7
\end{aligned}$$

$$Ir_a(I2, "(") = \text{clausura} \{ E \rightarrow (\bullet E) \} = I2$$

$$Ir_a(I2, id) = \text{clausura}(\{ E \rightarrow id \bullet \}) = \{ E \rightarrow id \bullet \} = I3$$

$$Ir_a(I2, n) = \text{clausura}(\{ E \rightarrow n \bullet \}) = \{ E \rightarrow n \bullet \} = I4$$

$$\forall X \in V: Ir_a(I3, X) = \emptyset$$

$$\forall X \in V: Ir_a(I4, X) = \emptyset$$

$$\begin{aligned}
Ir_a(I5, E) &= \text{clausura}(\{ E \rightarrow E + E \bullet, E \rightarrow E \bullet + E, E \rightarrow E \bullet * E \}) \\
&= \{ E \rightarrow E + E \bullet, E \rightarrow E \bullet + E, E \rightarrow E \bullet * E \} \\
&= I8
\end{aligned}$$

$$Ir_a(I5, "(") = \text{clausura} \{ E \rightarrow (\bullet E) \} = I2$$

$$Ir_a(I5, id) = \text{clausura}(\{ E \rightarrow id \bullet \}) = \{ E \rightarrow id \bullet \} = I3$$

$$Ir_a(I5, n) = \text{clausura}(\{ E \rightarrow n \bullet \}) = \{ E \rightarrow n \bullet \} = I4$$

$$\begin{aligned}
Ir_a(I6, E) &= \text{clausura}(\{ E \rightarrow E * E \bullet, E \rightarrow E \bullet + E, E \rightarrow E \bullet * E \}) \\
&= \{ E \rightarrow E * E \bullet, E \rightarrow E \bullet + E, E \rightarrow E \bullet * E \} \\
&= I9
\end{aligned}$$

$$Ir_a(I6, "(") = \text{clausura} \{ E \rightarrow (\bullet E) \} = I2$$

$$Ir_a(I6, id) = \text{clausura}(\{ E \rightarrow id \bullet \}) = \{ E \rightarrow id \bullet \} = I3$$

$$Ir_a(I6, n) = \text{clausura}(\{ E \rightarrow n \bullet \}) = \{ E \rightarrow n \bullet \} = I4$$

$$Ir_a(I7, "(") = \text{clausura}(\{ E \rightarrow (E) \bullet \}) = \{ E \rightarrow (E) \bullet \} = I10$$

$$Ir_a(I7, +) = \text{clausura}(\{ E \rightarrow E + \bullet E \}) = I5$$

$$Ir_a(I7, *) = \text{clausura}(\{ E \rightarrow E * \bullet E \}) = I6$$

$$Ir_a(I8, +) = \text{clausura}(\{ E \rightarrow E + \bullet E \}) = I5$$

$$\text{Ir}_a(I8, *) = \text{clausura}(\{ E \rightarrow E * \bullet E \}) = I6$$

$$\text{Ir}_a(I9, +) = \text{clausura}(\{ E \rightarrow E + \bullet E \}) = I5$$

$$\text{Ir}_a(I9, *) = \text{clausura}(\{ E \rightarrow E * \bullet E \}) = I6$$

$$\forall X \in V: \text{Ir}_a(I10, X) = \emptyset$$