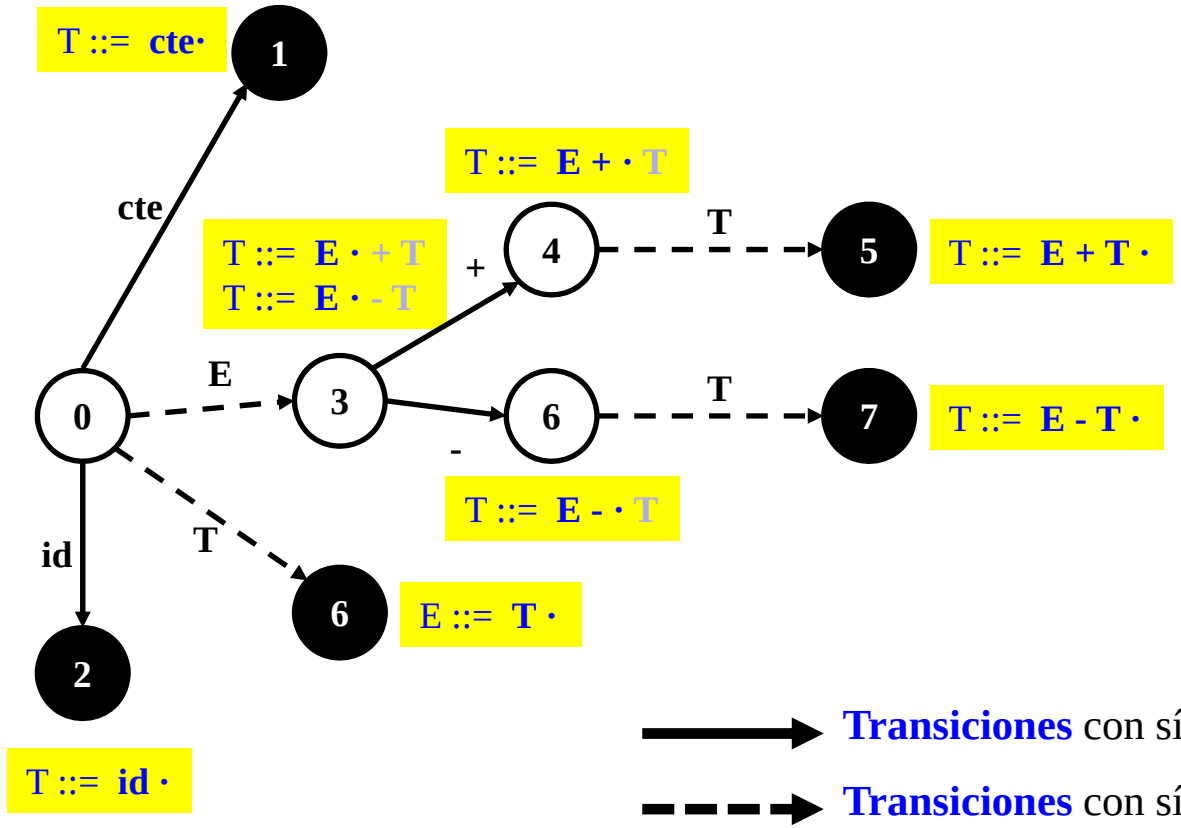
IDEA: el autómata reconoce los consecuentes

Gramática:
E ::= E + T | E – T | T
T ::= **cte** | **id**



Transiciones con símbolos de la **cadena de entrada**

Transiciones con símbolos de la **pila**

Analizadores Ascendentes

Analizador sintáctico LR(k)

Construcción de las tablas *acción* e *ir-a* con SLR

Algoritmo de construcción del conjunto canónico de *G'*.

```
i=0;  I_i = {Cierre([S' ::= ·S] )};  C = {I_i};
mientras (C cambie) {
   Para cada conjunto de ítems I_j ∈ C  y
   cada símbolo X ∈ G' {
```

Calcular **nuevos estados** resultado de **transiciones** desde el **estado actual**

```
   }
}
```

Analizadores Ascendentes

Analizador sintáctico LR(k)

Construcción de las tablas *acción* e *ir-a* con SLR

Algoritmo de construcción del conjunto canónico de *G'*.

```
i=0;  I_i = {Cierre([S' ::= ·S] )};  C = {I_i};
mientras (C cambie) {
   Para cada conjunto de ítems I_j ∈ C  y
   cada símbolo X ∈ G' {
      Si Ir-a(I_j, X) ≠ ∅ e Ir-a(I_j, X) ∉ C
      entonces{
         i = i + 1;
         I_i = Ir-a(I_j, X);
         C = {C ∪ I_i};
      }
   }
}
```

Analizadores Ascendentes

Analizador sintáctico LR(k)

Construcción de las tablas *acción* e *ir-a* con SLR

Ejemplo: Dada la gramática G con las producciones

E ::= E **+** T E ::= E **–** T E ::= T
T ::= **cte** T ::= **id**

y con los símbolos {E, T, +, -, cte, id}

cuyo axioma es E, hallar la colección canónica *C* de G'

```
E ::= E + T
      | E – T | T
T ::= cte | id
```

I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]}

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0
[E’ ::= ·E],[E ::= · E + T],
[E ::= · E - T] , [E ::= · T],
[T ::= · cte], [F ::= · id]

I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]}

Ir-a (I0, E) =

Cierre([E’ ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =

{[E’ ::= E ·]} ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =

{[E’ ::= E ·]} ∪ {[E ::= E · + T]} ∪ Cierre([E ::= E · - T]) =

{[E’ ::= E ·]} ∪ {[E ::= E · + T]} ∪ {[E ::= E · - T]} =

{[E’ ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1**

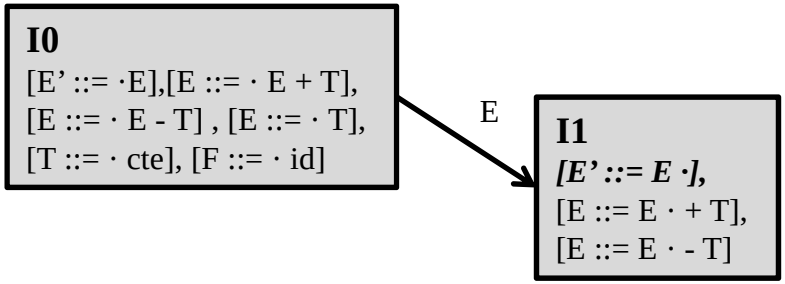
E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

¿Operaciones Ir-a posibles desde I0?

Sólo con los **símbolos después del · en algún ítem** del conjunto **I0:**

E, T, cte, id

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

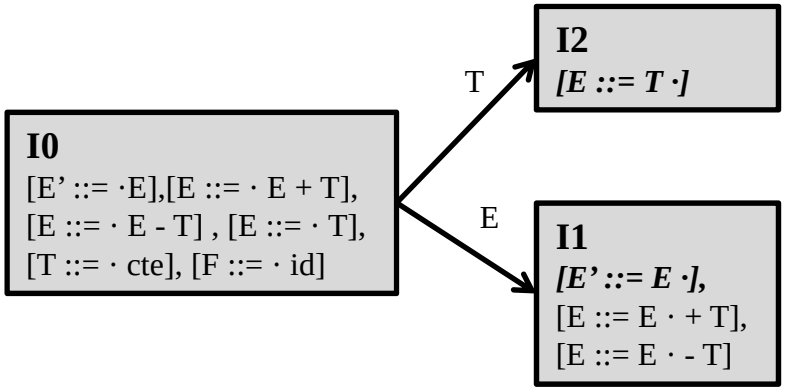


I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]}
Ir-a (I0, E) = Cierre([E’ ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E’ ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1**

Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

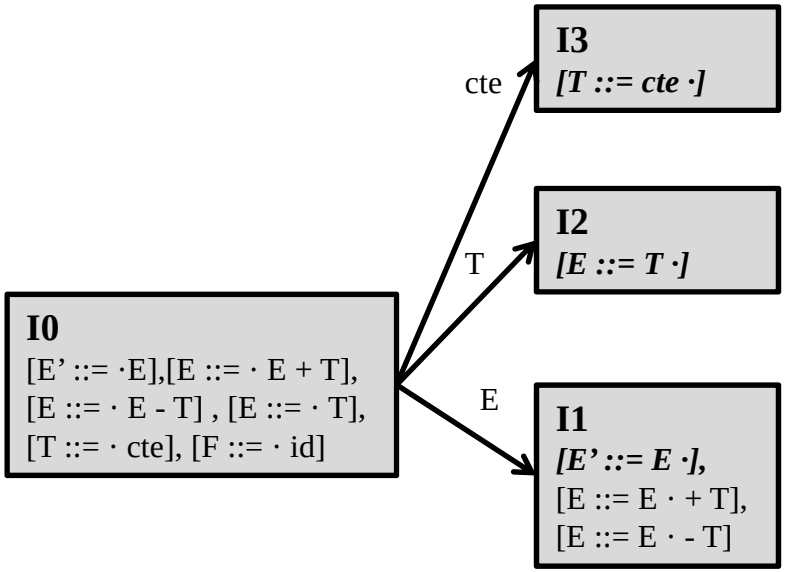


$I0 = Cierre([E' ::= \cdot E]) = \{[E' ::= \cdot E],$
$[E ::= \cdot E + T], [E ::= \cdot E - T], [E ::= \cdot T],$
$[T ::= \cdot cte], [T ::= \cdot id]\}$
$Ir\text{-}a\ (I0, E) = Cierre([E' ::= E \cdot]) \cup Cierre([E ::= E \cdot + T]) \cup Cierre([E ::= E \cdot - T]) =$
$\{[E' ::= E \cdot], [E ::= E \cdot + T], [E ::= E \cdot - T]\} =$ **I1**
$Ir\text{-}a\ (I0, T) = Cierre([E ::= T \cdot]) = \{[E ::= T \cdot]\} =$ **I2**

$Ir\text{-}a\ (I0, cte) = Cierre([T ::= cte \cdot]) = \{[E ::= cte \cdot]\} =$ **I3**

E' ::= E
E ::= E + T
| E – T | T
T ::= cte | id

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

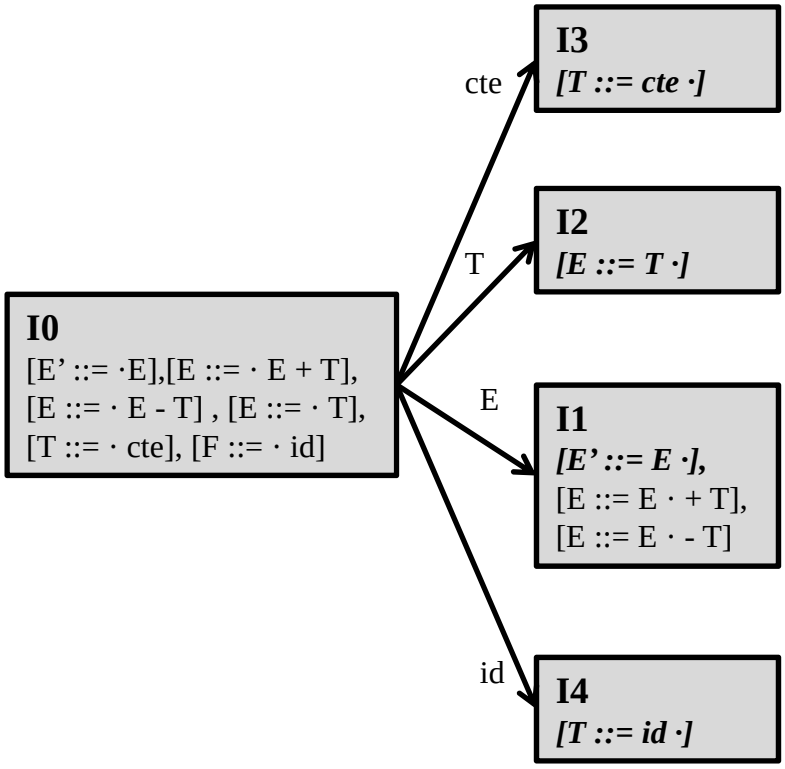


E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]}
Ir-a (I0, E) = Cierre([E’ ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E’ ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1**
Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**
Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[E ::= cte ·]} = **I3**

Ir-a (I0, id) = Cierre([T ::= id ·]) ={[E ::= id ·]} = **I4**

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id



I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]} ***⇦

Ir-a (I0, E) = Cierre([E’ ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E’ ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1**

Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**

Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[E ::= cte ·]} = **I3**

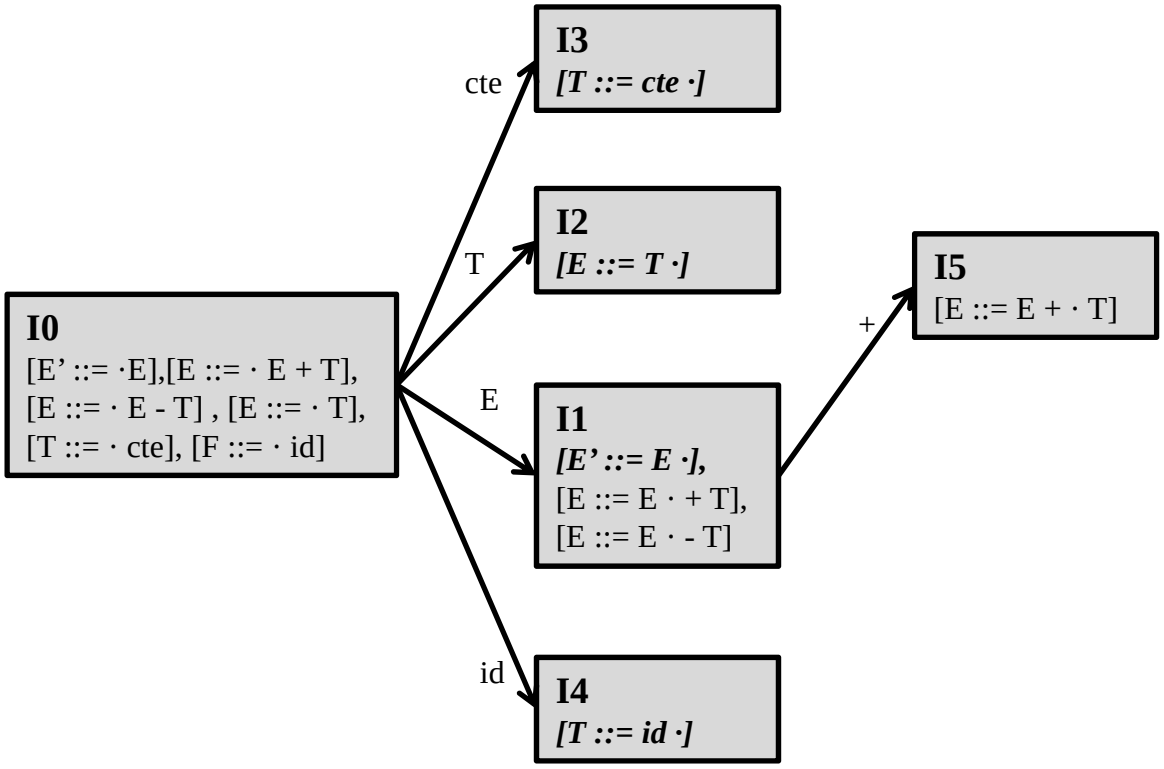
Ir-a (I0, id) = Cierre([T ::= id ·]) ={[E ::= id ·]} = **I4**

Ir-a (I1, +) = Cierre([E ::= E + · T]) = {[E ::= E + · T],
[T ::= · cte], [T ::= · id]} = **I5**

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

Recuerda (marca) los estados de los que ya has calculado **todas** las posibles operaciones **Ir-a**

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

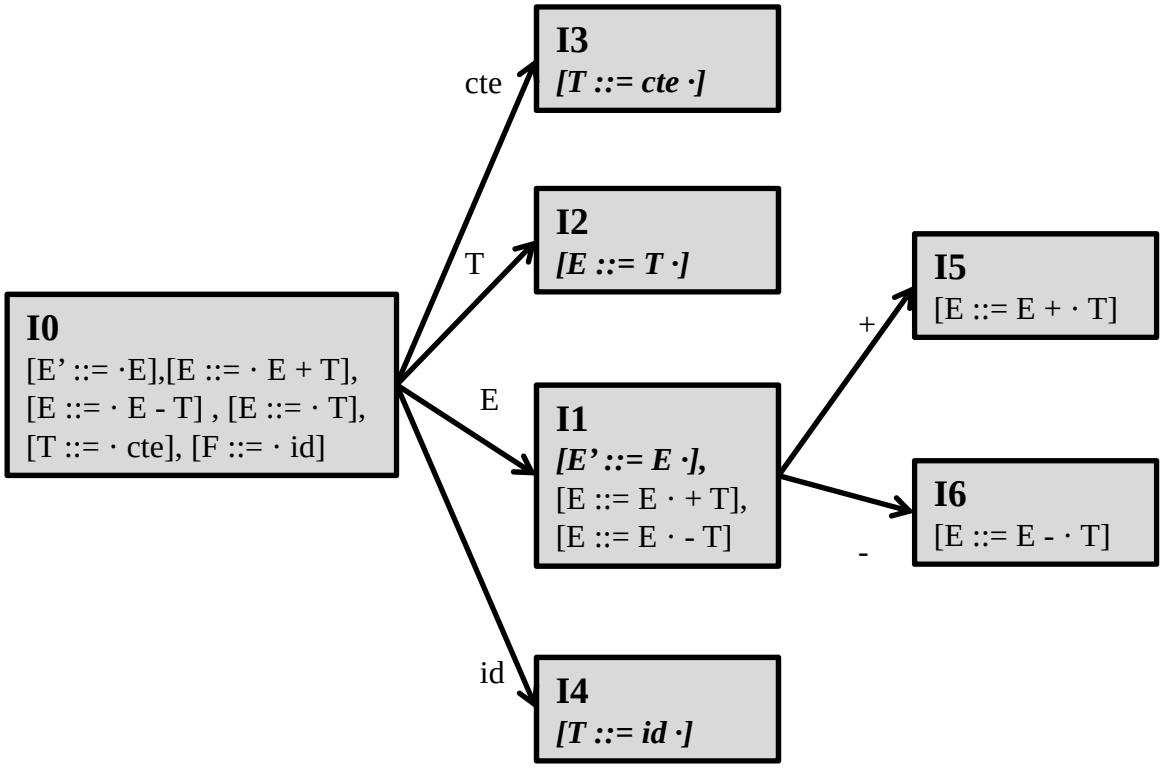


E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]} ***
Ir-a (I0, E) = Cierre([E’ ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E’ ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1**
Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**
Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[E ::= cte ·]} = **I3**
Ir-a (I0, id) = Cierre([T ::= id ·]) ={[E ::= id ·]} = **I4**
Ir-a (I1, +) = Cierre([E ::= E + · T]) = {[E ::= E + · T], [T ::= · cte], [T ::= · id]} = **I5**

Ir-a (I1, -) = Cierre([E ::= E - · T]) = {[E ::= E - · T],
[T ::= · cte], [T ::= · id]} = **I6**

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

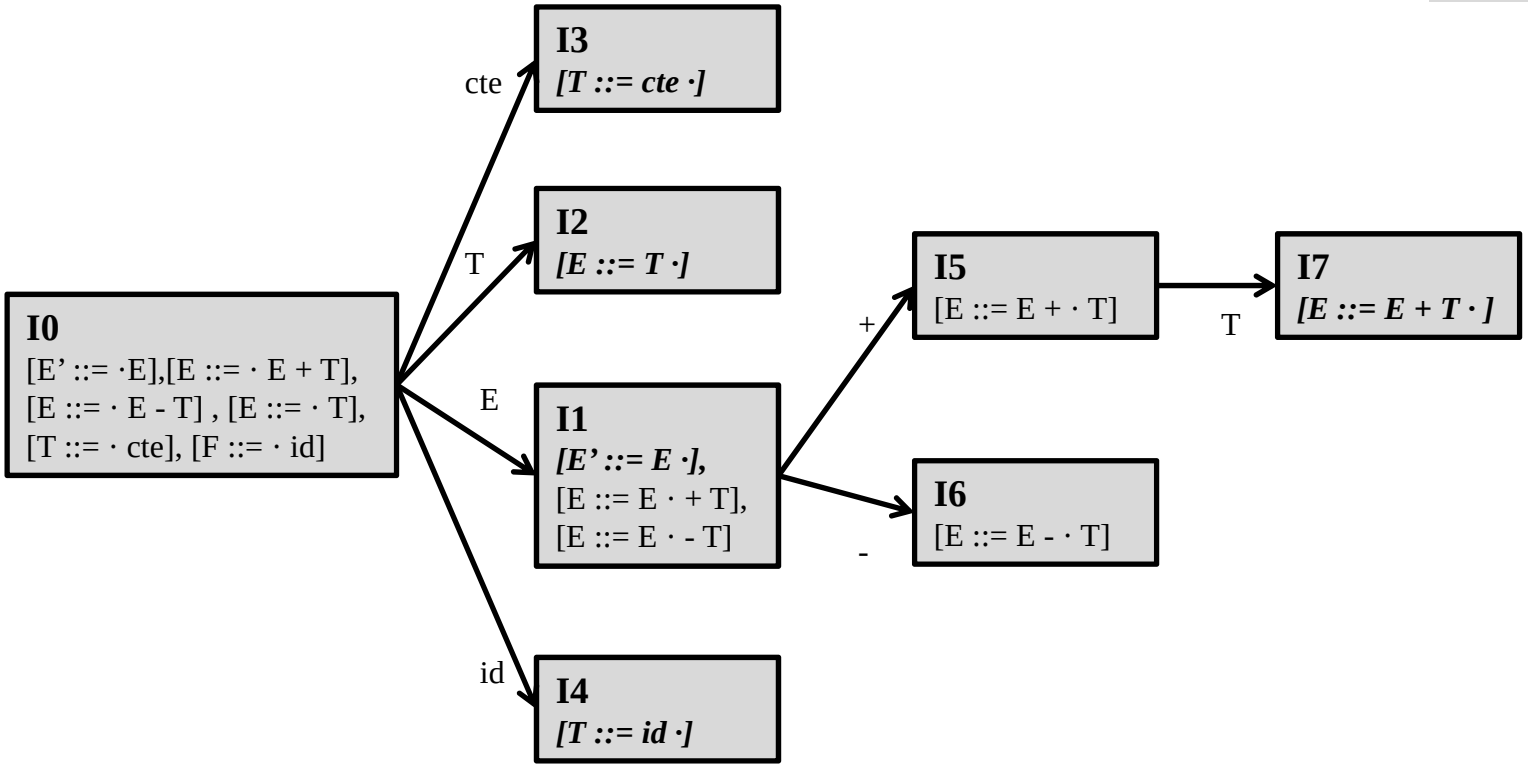


E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]} ***
Ir-a (I0, E) = Cierre([E’ ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E’ ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1** ***
Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**
Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[E ::= cte ·]} = **I3**
Ir-a (I0, id) = Cierre([T ::= id ·]) ={[E ::= id ·]} = **I4**
Ir-a (I1, +) = Cierre([E ::= E + · T]) = {[E ::= E + · T], [T ::= · cte], [T ::= · id]} = **I5**
Ir-a (I1, -) = Cierre([E ::= E - · T]) = {[E ::= E - · T], [T ::= · cte], [T ::= · id]} = **I6**

Ir-a (I5, T) = Cierre([E ::= E + T ·]) = {[E ::= E + T ·]} = **I7**

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id



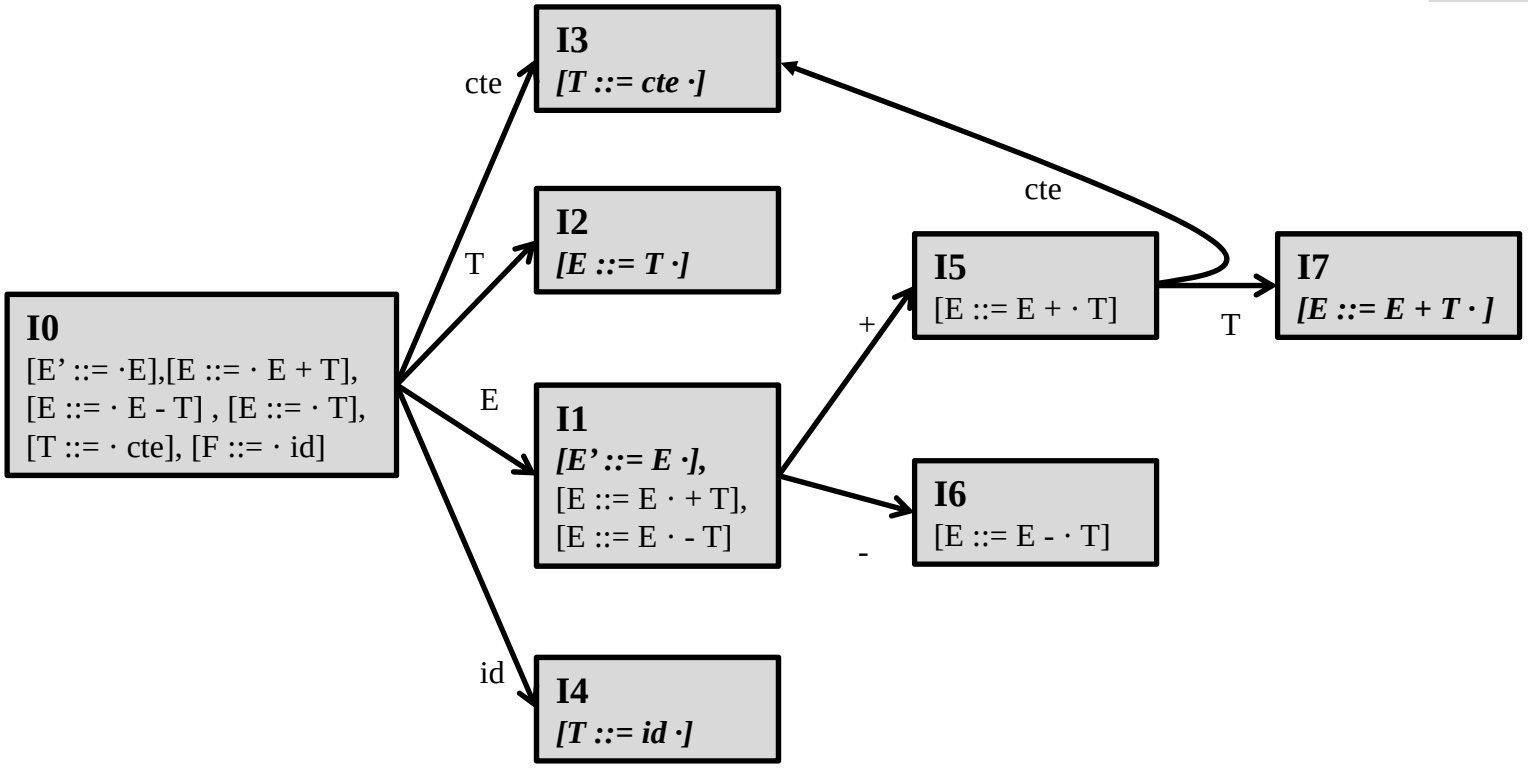
E' ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0 = Cierre([E' ::= ·E]) = {[E' ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]} ***
Ir-a (I0, E) = Cierre([E' ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E' ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1** ***
Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**
Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[T ::= cte ·]} = **I3**
Ir-a (I0, id) = Cierre([T ::= id ·]) ={[T ::= id ·]} = **I4**
Ir-a (I1, +) = Cierre([E ::= E + · T]) = {[E ::= E + · T], [T ::= · cte], [T ::= · id]} = **I5**
Ir-a (I1, -) = Cierre([E ::= E - · T]) = {[E ::= E - · T], [T ::= · cte], [T ::= · id]} = **I6**
Ir-a (I5, T) = Cierre([E ::= E + T ·]) = {[E ::= E + T ·]} = **I7**

Ir-a (I5, cte) = Cierre([T ::= cte ·])

No hace falta **volver a calcular** Cierre([T ::= cte ·]) porque ya sabemos que es **I3**

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

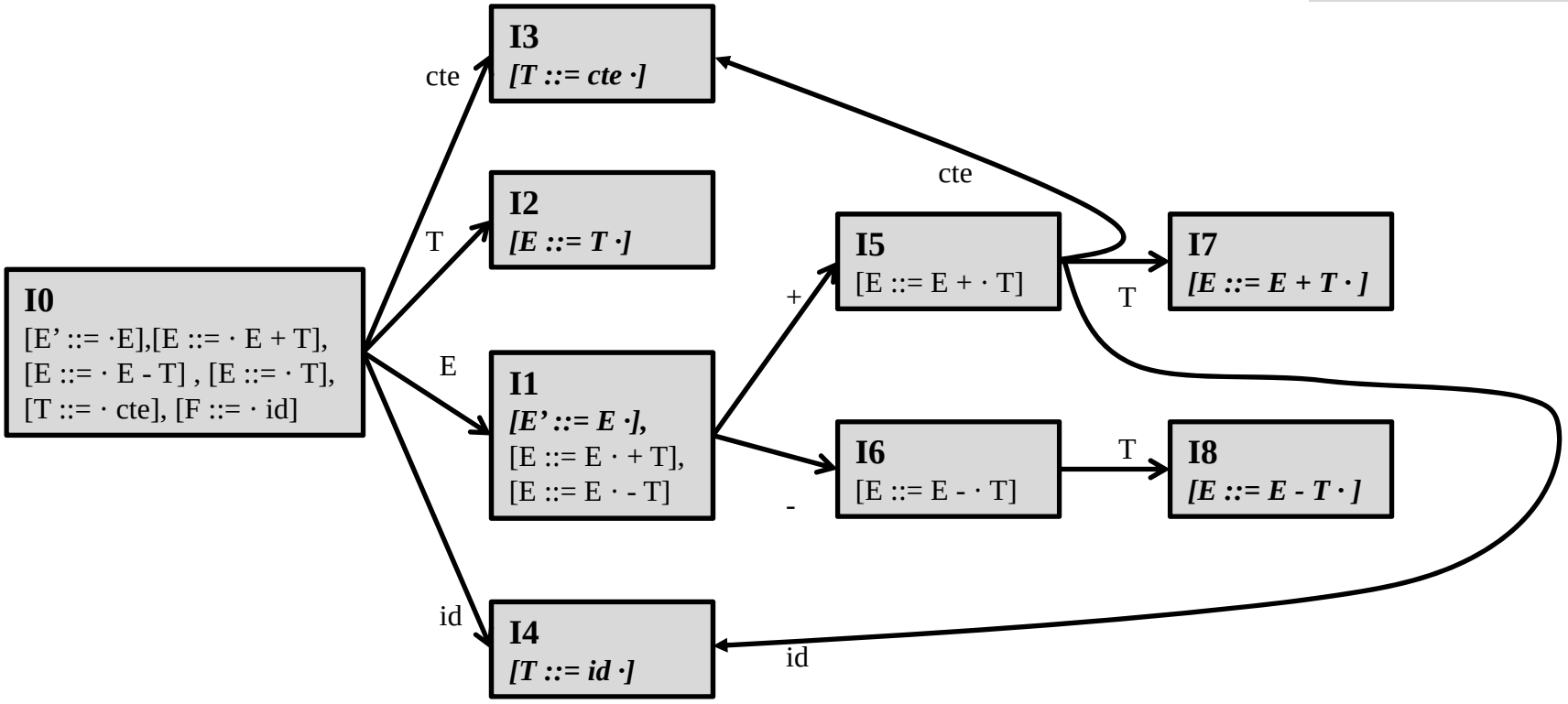


E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0 = Cierre([E’ ::= ·E]) = {[E’ ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]} ***
Ir-a (I0, E) = Cierre([E’ ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E’ ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1** ***
Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**
Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[T ::= cte ·]} = **I3**
Ir-a (I0, id) = Cierre([T ::= id ·]) ={[T ::= id ·]} = **I4**
Ir-a (I1, +) = Cierre([E ::= E + · T]) = {[E ::= E + · T], [T ::= · cte], [T ::= · id]} = **I5**
Ir-a (I1, -) = Cierre([E ::= E - · T]) = {[E ::= E - · T], [T ::= · cte], [T ::= · id]} = **I6**
Ir-a (I5, T) = Cierre([E ::= E + T ·]) = {[E ::= E + T ·]} = **I7**
Ir-a (I5, cte) = Cierre([T ::= cte ·]) = I3

Ir-a (I5, id) = Cierre([T ::= id·]) = I4

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id

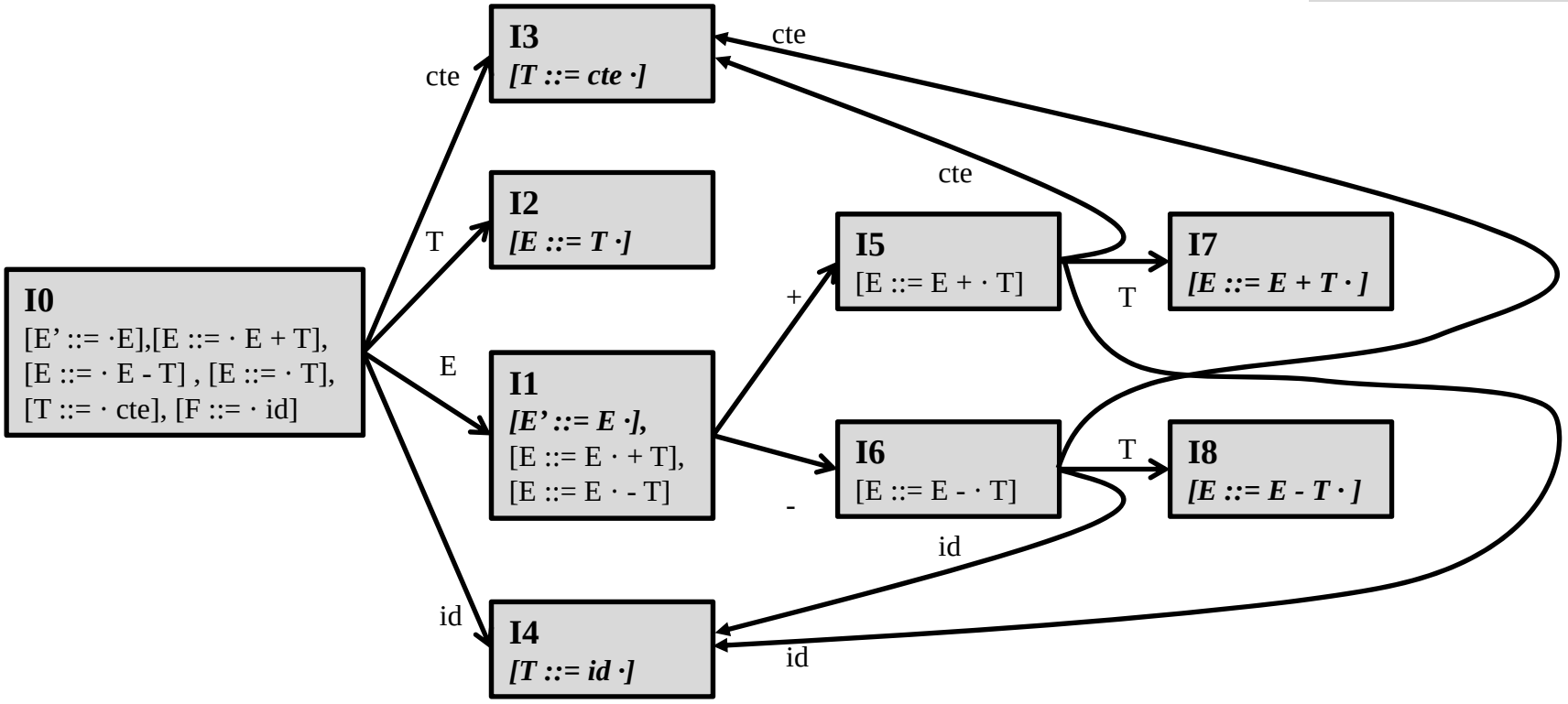


E' ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0 = Cierre([E' ::= ·E]) = {[E' ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]} ***
Ir-a (I0, E) = Cierre([E' ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E' ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1** ***
Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**
Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[T ::= cte ·]} = **I3**
Ir-a (I0, id) = Cierre([T ::= id ·]) ={[T ::= id ·]} = **I4**
Ir-a (I1, +) = Cierre([E ::= E + · T]) = {[E ::= E + · T], [T ::= · cte], [T ::= · id]} = **I5** ***
Ir-a (I1, -) = Cierre([E ::= E - · T]) = {[E ::= E - · T], [T ::= · cte], [T ::= · id]} = **I6**
Ir-a (I5, T) = Cierre([E ::= E + T ·]) = {[E ::= E + T ·]} = **I7**
Ir-a (I5, cte) = Cierre([T ::= cte ·]) = I3
Ir-a (I5, id) = Cierre([T ::= id·]) = I4

Ir-a (I6, T) = Cierre([E ::= E - T ·]) = {[E ::= E - T ·]} = **I8**
Ir-a (I6, cte) = Cierre([T ::= cte ·]) = I3
Ir-a (I6, id) = Cierre([T ::= id·]) = I4

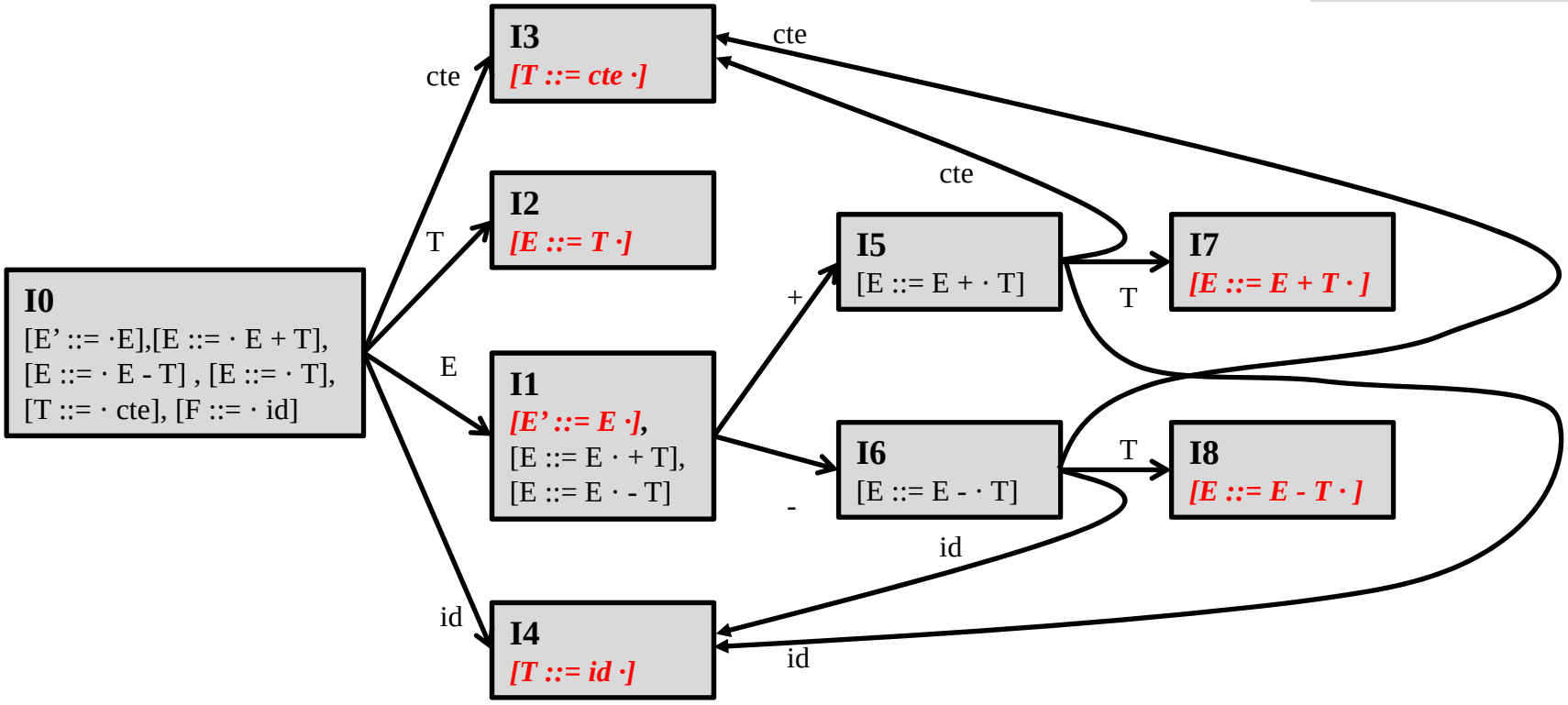
E' ::= E
E ::= E + T
| E – T | T
T ::= cte | id



E' ::= E
E ::= E + T
| E – T | T
T ::= cte | id

I0 = Cierre([E' ::= ·E]) = {[E' ::= ·E],
[E ::= ·E + T], [E ::= ·E - T], [E ::= ·T],
[T ::= · cte], [T ::= · id]} ***
Ir-a (I0, E) = Cierre([E' ::= E ·]) ∪ Cierre([E ::= E · + T]) ∪ Cierre([E ::= E · - T]) =
{[E' ::= E ·], [E ::= E · + T], [E ::= E · - T]} = **I1** ***
Ir-a (I0, T) = Cierre([E ::= T ·]) ={[E ::= T ·]} = **I2**
Ir-a (I0, cte) = Cierre([T ::= cte ·]) ={[T ::= cte ·]} = **I3**
Ir-a (I0, id) = Cierre([T ::= id ·]) ={[T ::= id ·]} = **I4**
Ir-a (I1, +) = Cierre([E ::= E + · T]) = {[E ::= E + · T], [T ::= · cte], [T ::= · id]} = **I5** ***
Ir-a (I1, -) = Cierre([E ::= E - · T]) = {[E ::= E - · T], [T ::= · cte], [T ::= · id]} = **I6**
Ir-a (I5, T) = Cierre([E ::= E + T ·]) = {[E ::= E + T ·]} = **I7** ***
Ir-a (I5, cte) = Cierre([T ::= cte ·]) = I3
Ir-a (I5, id) = Cierre([T ::= id·]) = I4
Ir-a (I6, T) = Cierre([E ::= E - T ·]) = {[E ::= E - T ·]} = **I8**
Ir-a (I6, cte) = Cierre([T ::= cte ·]) = I3
Ir-a (I6, id) = Cierre([T ::= id·]) = I4

E’ ::= E
E ::= E + T
| E – T | T
T ::= cte | id



Ejercicio:

E ::= E + T | T
T ::= T * F | F
F ::= (E) | id

Completa la colección de conjuntos I de esta gramática.
Consejos:

1. Mantén el **orden y la atención**, es un proceso laborioso
2. **No dejes operaciones** Ir-a de un estado **pendientes** de calcular
3. Trata de marcar de forma **diferenciada** las operaciones Ir-a que producen **estados nuevos**, de las que no lo hacen