Universidad Nacional Autónoma De México
Facultad de Ciencias

Semanal 3

Lenguajes de programacion

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1 Introduction

1. $(-(+203)(--18(+5020)))$
   (a) $sub(add(Num(20), Num(3)), sub(Num(-18), add(Num(50), Num(20))))$

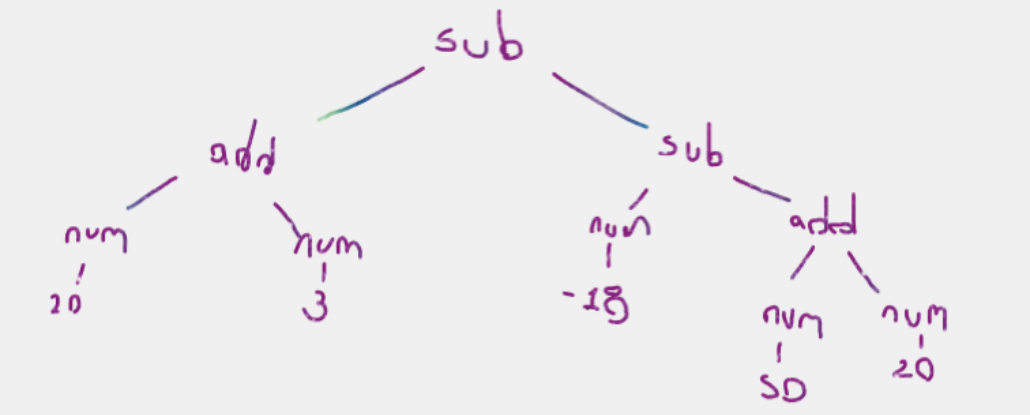

Figure 1: Sintaxis abstracta

   (b)
   (c) Semantica estructural
   $sub(add(Num(20), Num(3)), sub(Num(-18), add(Num(50), Num(20))))$
   $sub(Num(23)), sub(Num(-18), add(Num(50), Num(20))))$
   $sub(Num(23)), sub(Num(-18), Num(70))))$
   $sub(Num(23), Num(-88))$
   $Num(111)$

h

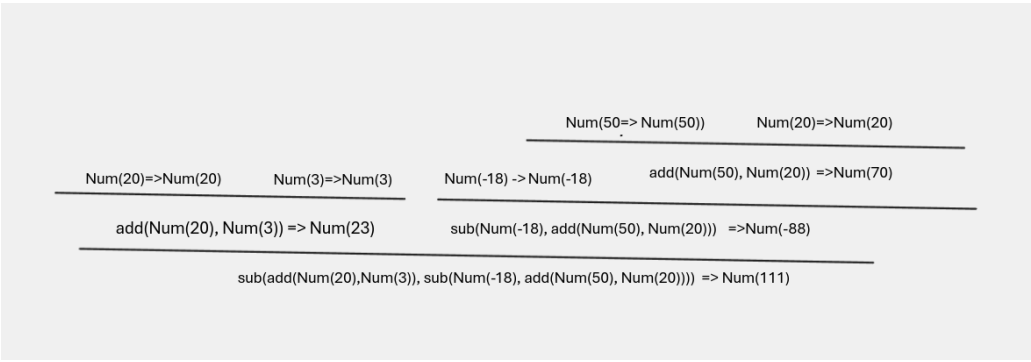

Figure 2: Natural

2. $(not(+1(-3(+-81))))$

   (a) $Not(Add(Num(1), Sub(Num(3), Add(Num(-8), Num(1)))))$

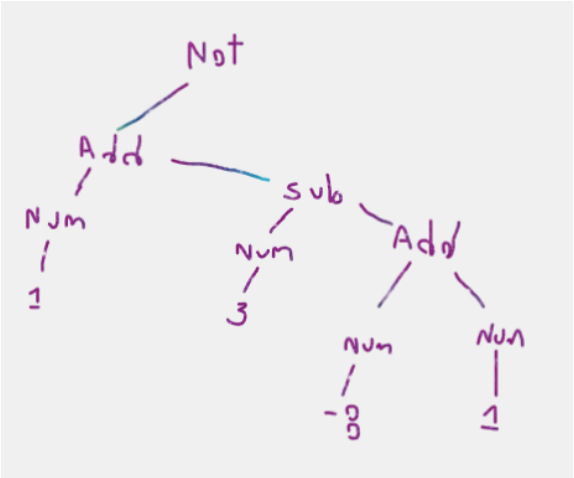

Figure 3: Enter Caption

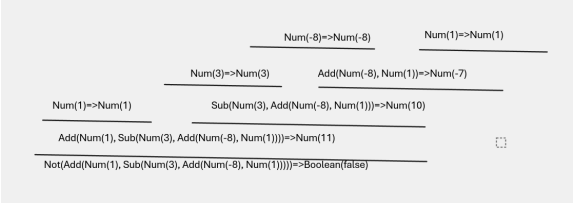

Figure 4: Enter Caption

   (b)

   (c) $Not(Add(Num(1), Sub(Num(3), Add(Num(-8), Num(1)))))->$
   $Not(Add(Num(1), Sub(Num(3), Num(7))))->$
   $Not(Add(Num(1), Num(-4)))->$
   $Not(Num(-3))-> False$

3. $(not(not(+35)))$

   (a) $Not(Not(Add(Num(3), Num(5))))$

   (b)

   (c) $Not(Not(Add(Num(3), Num(5))))$
   $Not(Not(Num(8)))$
   $Not(False)$
   $True$

Ejercicio 2.
Gramatica Libre de Contexto $<S>::=<E>$
$<E>::=<Int> | <Bool> | <Float> |(+<E><E>)$
$|(-<E><E>)|(*<E><E>)|$
$(/<E><E>)|(Not<E>)|(add1<E>)$

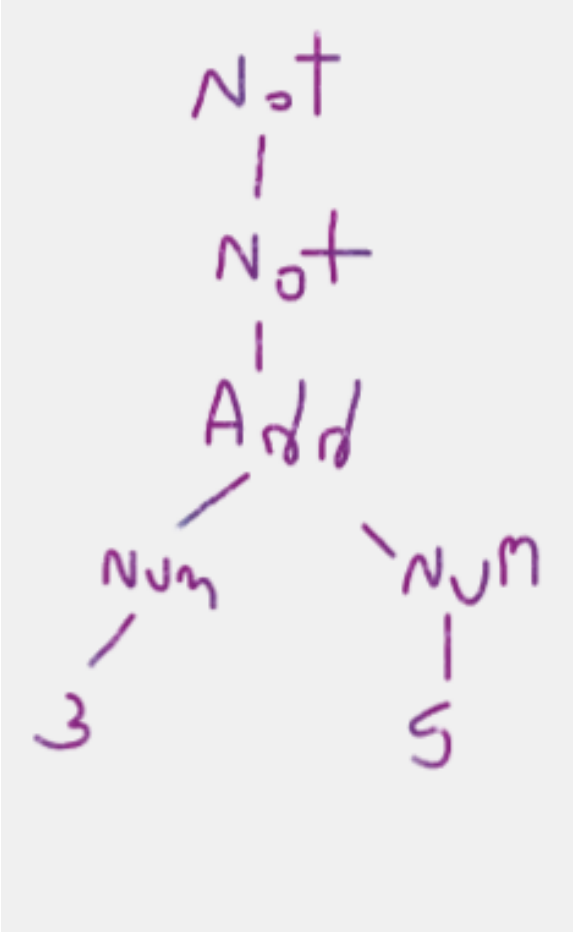

Figure 5: Enter Caption

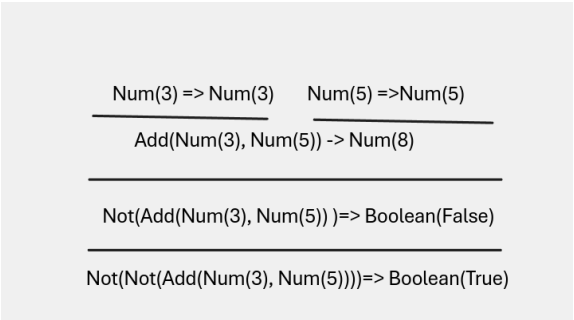

Figure 6: Enter Caption

$|(sub1 < E >)|(sqrt < E >) < Int >::=< N > |- < M >$
$< Bool >::= \#t|\#f$
$< Float >::=< Int > . < N >$
$< D >::= 1|2|3|4|5|6|7|8|9$
$< N >::= 0| < D > \{< N >\}$
$< M >::=< D > \{< N >\}$

Reglas de Sintaxis Abstracta
Numeros

$$\frac{\text{n}\epsilon\text{R}}{\text{Num(n) ASA}}$$

Multiplicacion

$$\frac{\text{i ASA} \qquad \text{d ASA}}{\text{Mult(i,d) ASA}}$$

Division

$$\frac{\text{i ASA} \qquad \text{d ASA}}{\text{Div(i,d) ASA}}$$

Sumar uno

$$\frac{\text{i ASA}}{\text{Add1(i) ASA}}$$

Restar uno

$$\frac{\text{i ASA}}{\text{Sub1(i) ASA}}$$

Raiz cuadrada

$$\frac{\text{i ASA}}{\text{Sqrt(i) ASA}}$$

Reglas de semántica natural y estructural

Natural

Multiplicacion

$$\frac{\text{i} \to Num(n_1) \qquad \text{d Num}(n_2)}{\text{Mult(i,d)} \to Num(n1 * n2)}$$

Division

$$\frac{\text{i} \to Num(n_1) \qquad \text{d Num(0)}}{\text{div(i,d)} \to \text{error: División entre cero}}$$

$$\frac{\text{i} \to Num(n_1) \qquad \text{d} \to Num(n_2)}{\text{div(i,d)} \to \text{Num(n1/n2)}}$$

SumarUno

$$\frac{\text{i} \to Num(n_1)}{\text{add1(i)} \to Num(n_1 + 1)}$$

RestarUno

$$\frac{\text{i} \to Num(n_1)}{\text{sub1(i)} \to Num(n_1 - 1)}$$

RaizCuadrada

$$\frac{\text{i} \rightarrow Num(n) \qquad \text{n} \in (R^{-})}{\text{Sqrt(i)} \rightarrow \text{error: Raiz negativa}}$$

$$\frac{\text{i} \rightarrow Num(n_1)}{\text{Sqrt(i)} \rightarrow Num(\sqrt{n_1})}$$

Estructural
Multiplicacion

Caso 1:

$$\frac{\text{i} \rightarrow \text{i'}}{\text{Mult(i,d)} \rightarrow \text{Mult(i',d)}}$$

Caso 2:

$$\frac{\text{d} \rightarrow \text{d'}}{\text{Mult(Num(n),d)} \rightarrow \text{Mult(Num(n),d')}}$$

Caso 3:

$$\frac{}{\text{Mult(Num(n1),Num(n2))} \rightarrow \text{Num(n1 * n2)}}$$

Division

Caso 1:

$$\frac{\text{i} \rightarrow \text{i'}}{\text{Div(i,d)} \rightarrow \text{Div(i',d)}}$$

Caso 2:

$$\frac{\text{d} \rightarrow \text{d'}}{\text{Div(Num(n1),d)} \rightarrow \text{Div(Num(n1),d')}}$$

Caso 3:

$$\frac{}{\text{Div(Num(n),Num(0))} \rightarrow \text{'error: Division entre cero'}}$$

Caso 4:

$$\frac{\text{n2} \in \text{R - \{0\}}}{\text{Div(Num(n1),Num(n2))} \rightarrow \text{Num(n1/n2)}}$$

Sumar uno

Caso 1:

$$\frac{\text{i} \rightarrow \text{i'}}{\text{Add1(i)} \rightarrow \text{Add1(i')}}$$

Caso 2:

$$\frac{}{\text{Add1(Num(n1))} \rightarrow \text{Num(n1 + 1)}}$$

Restar uno

Caso 1:

$$\frac{\text{i} \rightarrow \text{i'}}{\text{Sub1(i)} \rightarrow \text{Sub1(i')}}$$

Caso 2:

$$\frac{}{\text{Sub1(Num(n1))} \rightarrow \text{Num(n1 - 1)}}$$

Raiz cuadrada

Caso 1:

$$\frac{\text{i} \rightarrow \text{i'}}{\text{Sqrt(i)} \rightarrow \text{Sqrt(i')}}$$

Caso3:

$$\frac{n_1 \in R^-}{\text{Srqt(Num}(n_1) \rightarrow \text{'error: Raiz negativa'}}$$

Caso3:

$$\frac{n_1 \in R^+ \cup 0}{\text{Srqt(Num}(n_1) \rightarrow \text{Num}(\sqrt{n_1})}$$