**EXPRESIÓN REGULAR**

|  |  |
| --- | --- |
| **Gramática** | **Token que devuelve** |
| + | PLUS |
| - | MINUS |
| \* | MULT |
| / | DIV |
| ++ | INCREMENTAR |
| -- | DECREMENTAR |
| ( | OPEN\_PARENTHESES |
| ) | CLOSED\_PARETHESES |
| ; | END |
| = | EQUAL |
| > | MAJOR |
| < | MINOR |
| >= | MAJOR\_EQUAL |
| <= | MINOR\_EQUAL |
| == | COMPARATION |
| != | DIFFERENT |
| || | OR |
| && | AND |
| ! | \_? |
| SI | SI |
| SINO | SINO |
| SINO\_SI | SINO\_SI |
| MIENTRAS | MIENTRAS |
| HACER | HACER |
| DESDE | DESDE |
| HASTA | HASTA |
| INCREMENTO | INCREMENTO |
| (/./) (a…z|A…Z)\* | COMENTARIO |
| (/.\*) (a…z|A…Z|epsilum)\* (\*./) | COMENTARIO\_EXTERIOR |
| Entero | INTEGER |
| Decimal | DOUBLE |
| Cadena | STRING |
| Boolean | BOOLEAN |
| Chart | CHAR |

**CÁLCULO DE SIGUIENTES**

**ENTERO**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | E | 2 |
| 2 | n | 3 |
| 3 | t | 4 |
| 4 | e | 5 |
| 5 | r | 6 |
| 6 | o | 7 |
| 7 | $ | - |

So = 1

δ(So,E)=2=S1

δ(S1,n)=3=S2

δ(S2,t)=4=S3

δ(S3,e)=5=S4

δ(S4,r)=6=S5

δ(S5,o)=7=S6

Definición Formal AFD

1. Q=So, S1, S2, S3, S4, S5, S6
2. E=E,n,t,e,r,o
3. So
4. F=S6
5. δ(So,E)=S1

δ(S1,n) =S2

δ(S2,t) =S3

δ(S3,e) =S4

δ(S4,r) =S5

δ(S5,o) =S6

**DECIMAL**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | D | 2 |
| 2 | e | 3 |
| 3 | c | 4 |
| 4 | i | 5 |
| 5 | m | 6 |
| 6 | a | 7 |
| 7 | l | 8 |
| 8 | $ | - |

So=1

δ(So,D)=2=S1

δ(S1,e)=3=S2

δ(S2,c)=4=S3

δ(S3,i)=5=S4

δ(S4,m)=6=S5

δ(S5,a)=7=S6

δ(S6,l)=8=S7

Definición Formal AFD

1. Q=So, S1, S2, S3, S4, S5, S6,S7
2. E=D,e,c,i,m,a,l
3. So
4. F=S7
5. δ(So,D)=S1

δ(S1,e) =S2

δ(S2,c) =S3

δ(S3,i) =S4

δ(S4,m) =S5

δ(S5,a) =S6

δ(S6,l) =S7

**Cadena**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | C | 2 |
| 2 | a | 3 |
| 3 | d | 4 |
| 4 | e | 5 |
| 5 | n | 6 |
| 6 | a | 7 |
| 7 | $ | - |

So=1

δ(So,C)=2=S1

δ(S1,a)=3=S2

δ(S2,d)=4=S3

δ(S3,e)=5=S4

δ(S4,n)=6=S5

δ(S5,a)=7=S6

Definición Formal AFD

1. Q=So, S1, S2, S3, S4, S5, S6
2. E=C,a,d,e,n,a
3. So
4. F=S6
5. δ(So,C)=S1

δ(S1,a) =S2

δ(S2,d) =S3

δ(S3,e) =S4

δ(S4,n) =S5

δ(S5,a) =S6

**Boolean**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | B | 2 |
| 2 | o | 3 |
| 3 | o | 4 |
| 4 | l | 5 |
| 5 | e | 6 |
| 6 | a | 7 |
| 7 | N | 8 |
| 8 | $ | - |

So=1

δ(So,B)=2=S1

δ(S1,o)=3=S2

δ(S2,o)=4=S3

δ(S3,l)=5=S4

δ(S4,e)=6=S5

δ(S5,a)=7=S6

δ(S6,n)=8=S7

Definición Formal AFD

1. Q=So, S1, S2, S3, S4, S5, S6,S7
2. E=C,a,d,e,n,a
3. So
4. F=S7
5. δ(So,B)=S1

δ(S1,o) =S2

δ(S2,o) =S3

δ(S3,l) =S4

δ(S4,e) =S5

δ(S5,a) =S6

δ(S6,n) =S7

**Chart**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | C | 2 |
| 2 | h | 3 |
| 3 | a | 4 |
| 4 | r | 5 |
| 5 | t | 6 |
| 6 | $ | - |

So=1

δ(So,C)=2=S1

δ(S1,h)=3=S2

δ(S2,a)=4=S3

δ(S3,r)=5=S4

δ(S4,t)=6=S5

Definición Formal AFD

1. Q=So, S1, S2, S3, S4, S5
2. E=C,h,a,r,t
3. So
4. F=S5
5. δ(So,C)=S1

δ(S1,h) =S2

δ(S2,a) =S3

δ(S3,r) =S4

δ(S4,t) =S5

**//**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | / | 2 |
| 2 | / | 3,4,5 |
| 3 | Minúsculas | 3,4,5 |
| 4 | Mayúsculas | 3,4,5 |
| 5 | $ | - |

So=1

δ(So,/)=2=S1

δ(S1,/)=3,4,5=S2

δ(S2,Minúsculas)=3,4,5=S2

δ(S2,Mayúsculas)= 3,4,5=S2

Definición Formal AFD

1. Q=So, S1, S2
2. E=/,/,Minúsculas,Mayúsculas
3. So
4. F=S2
5. δ(So,/)=S1

δ(S1,/) =S2

δ(S2,Minúsculas) =S2

δ(S2,Mayúsculas) =S2

/\*\*/

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | / | 2 |
| 2 | \* | 3,4,5,6 |
| 3 | Minúsculas | 3,4,5,6 |
| 4 | Mayúsculas | 3,4,5,6 |
| 5 | epsilum | 3,4,5,6 |
| 6 | \* | 7 |
| 7 | / | 8 |
| 8 | $ | - |

So=1

δ(So,/)=2=S1

δ(S1,\*)=3,4,5,6=S2

δ(S2,Minúsculas) =S2

δ(S2,Mayúsculas) =S2

δ(S2,epsilum)=S2

δ(S2,\*)=7=S3

δ(S3,/)=8=S4

Definición Formal AFD

1. Q=So, S1, S2, S3, S4
2. E=/,\*,Minúsculas,Mayúsculas, epsilum
3. So
4. F=S4
5. δ(So,/)=S1

δ(S1,\*) =S2

δ(S2,Minúsculas) =S2

δ(S2,Mayúsculas) =S2

δ(S2,epsilum)=S2

δ(S2,\*)=S3

δ(S3,/)=S4

SI

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | S | 2 |
| 2 | I | 3 |
| 3 | $ | - |

So=1

δ(So,S)=2=S1

δ(S1,I)=3=S2

Definición Formal AFD

1. Q=So, S1, S2
2. E=S,I
3. So
4. F=S2
5. δ(So,S)=S1

δ(S1,I) =S2

**SINO**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | S | 2 |
| 2 | I | 3 |
| 3 | N | 4 |
| 4 | O | 5 |
| 5 | $ | - |

So=1

δ(So,S)=2=S1

δ(S1,I)=3=S2

δ(S2,N)=4=S3

δ(S3,O)=5=S4

Definición Formal AFD

1. Q=So, S1, S2,S3,S4
2. E=S,I,N,O
3. So
4. F=S4
5. δ(So,S)=S1

δ(S1,I) =S2

δ(S2,N) =S3

δ(S3,O) =S4

SINO\_SI

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | S | 2 |
| 2 | I | 3 |
| 3 | N | 4 |
| 4 | O | 5 |
| 5 | \_ | 6 |
| 6 | S | 7 |
| 7 | I | 8 |
| 8 | $ | - |

So=1

δ(So,S)=2=S1

δ(S1,I)=3=S2

δ(S2,N)=4=S3

δ(S3,O)=5=S4

δ(S4,\_)=6=S5

δ(S5,S)=7=S6

δ(S6,I)=8=S7

Definición Formal AFD

1. Q=So, S1, S2,S3,S4,S5,S6,S7
2. E=S,I,N,O
3. So
4. F=S7
5. δ(So,S)=S1

δ(S1,I) =S2

δ(S2,N) =S3

δ(S3,O) =S4

δ(S4,\_) =S5

δ(S5,S) =S6

δ(S6,I) =S7

**MIENTRAS**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | M | 2 |
| 2 | I | 3 |
| 3 | E | 4 |
| 4 | N | 5 |
| 5 | T | 6 |
| 6 | R | 7 |
| 7 | A | 8 |
| 8 | S | 9 |
| 9 | $ | - |

So=1

δ(So,M)=2=S1

δ(S1,I)=3=S2

δ(S2,E)=4=S3

δ(S3,N)=5=S4

δ(S4,T)=6=S5

δ(S5,R)=7=S6

δ(S6,A)=8=S7

δ(S7,S)=9=S8

Definición Formal AFD

1. Q=So, S1, S2,S3,S4,S5,S6,S7,S8
2. E=M,I,E,N,T,R,A,S
3. So
4. F=S8
5. δ(So,M)=S1

δ(S1,I) =S2

δ(S2,E) =S3

δ(S3,N) =S4

δ(S4,T) =S5

δ(S5,R) =S6

δ(S6,A) =S7

δ(S7,S) =S8

**HACER**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | H | 2 |
| 2 | A | 3 |
| 3 | C | 4 |
| 4 | E | 5 |
| 5 | R | 6 |
| 6 | $ | - |

So=1

δ(So,H)=2=S1

δ(S1,A)=3=S2

δ(S2,C)=4=S3

δ(S3,E)=5=S4

δ(S4,R)=6=S5

Definición Formal AFD

1. Q=So, S1, S2,S3,S4,S5
2. E=H,A,C,E,R
3. So
4. F=S5
5. δ(So,H)=S1

δ(S1,A) =S2

δ(S2,C) =S3

δ(S3,E) =S4

δ(S4,R) =S5

**DESDE**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | D | 2 |
| 2 | E | 3 |
| 3 | S | 4 |
| 4 | D | 5 |
| 5 | E | 6 |
| 6 | $ | - |

So=1

δ(So,D)=2=S1

δ(S1,E)=3=S2

δ(S2,S)=4=S3

δ(S3,D)=5=S4

δ(S4,E)=6=S5

Definición Formal AFD

1. Q=So, S1, S2,S3,S4,S5
2. E=D,E,S
3. So
4. F=S5
5. δ(So,D)=S1

δ(S1,E) =S2

δ(S2,S) =S3

δ(S3,D) =S4

δ(S4,E) =S5

**HASTA**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | H | 2 |
| 2 | A | 3 |
| 3 | S | 4 |
| 4 | T | 5 |
| 5 | A | 6 |
| 6 | $ | - |

So=1

δ(So,H)=2=S1

δ(S1,A)=3=S2

δ(S2,S)=4=S3

δ(S3,T)=5=S4

δ(S4,A)=6=S5

Definición Formal AFD

1. Q=So, S1, S2,S3,S4,S5
2. E=H,A,S,T
3. So
4. F=S5
5. δ(So,H)=S1

δ(S1,A) =S2

δ(S2,S) =S3

δ(S3,T) =S4

δ(S4,A) =S5

**INCREMENTO**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | I | 2 |
| 2 | N | 3 |
| 3 | C | 4 |
| 4 | R | 5 |
| 5 | E | 6 |
| 6 | M | 7 |
| 7 | E | 8 |
| 8 | N | 9 |
| 9 | T | 10 |
| 10 | O | 11 |
| 11 | $ | - |

So=1

δ(So,I)=2=S1

δ(S1,N)=3=S2

δ(S2,C)=4=S3

δ(S3,R)=5=S4

δ(S4,E)=6=S5

δ(S5,M)=7=S6

δ(S6,E)=8=S7

δ(S7,N)=9=S8

δ(S8,T)=10=S9

δ(S9,O)=11=S10

Definición Formal AFD

1. Q=So, S1, S2,S3,S4,S5,S6,S7,S8,S9,S10
2. E=I,N,C,R,E,M,T,O
3. So
4. F=S10
5. δ(So,I)=S1

δ(S1,N) =S2

δ(S2,C) =S3

δ(S3,R) =S4

δ(S4,E) =S5

δ(S5,M) =S6

δ(S6,E) =S7

δ(S7,N) =S8

δ(S7,T) =S9

δ(S7,O) =S10

+

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | + | 2 |
| 2 | $ | - |

So=1

δ(So,+)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E=+
3. So
4. F=S1
5. δ(So,+)=S1

**-**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | - | 2 |
| 2 | $ | - |

So=1

δ(So,-)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E=-
3. So
4. F=S1
5. δ(So,-)=S1

**\***

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | \* | 2 |
| 2 | $ | - |

So=1

δ(So,\*)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E=\*
3. So
4. F=S1
5. δ(So,\*)=S1

**/**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | / | 2 |
| 2 | $ | - |

So=1

δ(So,/)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E=/
3. So
4. F=S1
5. δ(So,/)=S1

**++**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | + | 2 |
| 2 | + | 3 |
| 3 | $ | - |

So=1

δ(So,+)=2=S1

δ(S1,+)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E=+
3. So
4. F=S2
5. δ(So,+)=S1
6. δ(S1,+)=S2

**--**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | - | 2 |
| 2 | - | 3 |
| 3 | $ | - |

So=1

δ(So,-)=2=S1

δ(S1,-)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E=-
3. So
4. F=S2
5. δ(So,-)=S1
6. δ(S1,-)=S2

**(**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | ( | 2 |
| 2 | $ | - |

So=1

δ(So,( )=2=S1

Definición Formal AFD

1. Q=So, S1
2. E= (
3. So
4. F=S1
5. δ(So,( )=S1

)

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | ) | 2 |
| 2 | $ | - |

So=1

δ(So,) )=2=S1

Definición Formal AFD

1. Q=So, S1
2. E= )
3. So
4. F=S1
5. δ(So,) )=S1

**;**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | ; | 2 |
| 2 | $ | - |

So=1

δ(So,; )=2=S1

Definición Formal AFD

1. Q=So, S1
2. E= ;
3. So
4. F=S1
5. δ(So, ; )=S1

**=**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | = | 2 |
| 2 | $ | - |

So=1

δ(So,=)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E= =
3. So
4. F=S1
5. δ(So, = )=S1

**>**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | > | 2 |
| 2 | $ | - |

So=1

δ(So,>)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E= >
3. So
4. F=S1
5. δ(So, > )=S1

**<**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | < | 2 |
| 2 | $ | - |

So=1

δ(So,<)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E= <
3. So
4. F=S1
5. δ(So,<)=S1

**>=**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | > | 2 |
| 2 | = | 3 |
| 3 | $ | - |

So=1

δ(So,>)=2=S1

δ(S1,=)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E=>,=
3. So
4. F=S2
5. δ(So,>)=S1

δ(S1,=)=S2

**<=**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | < | 2 |
| 2 | = | 3 |
| 3 | $ | - |

So=1

δ(So,<)=2=S1

δ(S1,=)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E=<,=
3. So
4. F=S2
5. δ(So,<)=S1

δ(S1,=)=S2

**==**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | = | 2 |
| 2 | = | 3 |
| 3 | $ | - |

So=1

δ(So,=)=2=S1

δ(S1,=)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E==
3. So
4. F=S2
5. δ(So,=)=S1

δ(S1,=)=S2

**!=**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | ! | 2 |
| 2 | = | 3 |
| 3 | $ | - |

So=1

δ(So,!)=2=S1

δ(S1,=)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E=!,=
3. So
4. F=S2
5. δ(So,!)=S1

δ(S1,=)=S2

**||**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | | | 2 |
| 2 | | | 3 |
| 3 | $ | - |

So=1

δ(So,|)=2=S1

δ(S1,|)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E=|
3. So
4. F=S2
5. δ(So,|)=S1

δ(S1,|)=S2

**&&**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | & | 2 |
| 2 | & | 3 |
| 3 | $ | - |

So=1

δ(So,&)=2=S1

δ(S1,&)=3=S2

Definición Formal AFD

1. Q=So, S1,S2
2. E=&
3. So
4. F=S2
5. δ(So,&)=S1

δ(S1,&)=S2

**!**

|  |  |  |
| --- | --- | --- |
| **No** | **E** | **Siguiente No** |
| 1 | ! | 2 |
| 2 | $ | - |

So=1

δ(So,!)=2=S1

Definición Formal AFD

1. Q=So, S1
2. E= !
3. So
4. F=S1
5. δ(So, ! )=S1