Teoría de Autómatas y Lenguajes Formales

Práctica 4: Numeración de Programas y EXWHILE

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December 25, 2022

1 Exercise 1

Create the simplest WHILE program that computes the diverge function (with zero arguments) and compute the codification of its code.

$X1 := X1 + 1;$
while $X1 \neq 0$ **do**
$X1 := X1$
od
$X1 := X1$
Using the Octave script WHILE2N, the codification of this code is 9678230627.

2 Exercise 2

Create an Octave script that enumerates all the vectors.

```
function element = enumVectors()
  n = 0
  while n >= 0
    godeldecoding(n)
    n = n+1
  endwhile
endfunction
```

```
>> enumVectors
n = 0
ans = [](0x0)
n =  1
ans = 0
n =  2
ans =

  0  0

n =  3
ans = 1
n =  4
ans =

   0   0   0

n =  5
ans =

  1  0

n =  6
ans = 2
n =  7
ans =

   0   0   0   0

n =  8
ans =

   1   0   0

n =  9
ans =

  0  1

n =  10
ans = 3
```

3 Exercise 3

Create an Octave script that enumerates all the WHILE programs.

```
function element = enumWhile()
  n = 0
  while n >= 0
    N2WHILE(n)
    n = n+1
  endwhile
endfunction
```

```
>> clc
>> enumWhile
n = 0
ans = (0, X1=0)
n =  1
ans = (1, X1=0)
n =  2
ans = (0, X1=0; X1=0)
n =  3
ans = (2, X1=0)
n =  4
ans = (1, X1=0; X1=0)
n =  5
ans = (0, X1=X1)
n =  6
ans = (3, X1=0)
n =  7
ans = (2, X1=0; X1=0)
n =  8
ans = (1, X1=X1)
n =  9
ans = (0, X1=0; X1=0; X1=0)
n =  10
ans = (4, X1=0)
```