Codigo DSP:

```
        LIST


        ; en X estan los bits de parte entera
        ; en Y estan los bits fraccionarios

        ORG   X:$999
VARIABLE_X_1 DS 500

        ORG X:$1999
VARIABLE_Y_1 DS 500

        ORG   P:$E000



main    move  #$1000,r0 ; posicion inicial de X
              move  #$2000,r1 ; posicion inicial de Y

              ; inicializamos x(0)=1 para la respuesta al impulso

              move  #$100000,a0
              move  a0,x:(r0)

              ; reseteo posiciones iniciales

              move  #$1000,r0 ; posicion inicial de X
              move  #$2000,r1 ; posicion inicial de Y

              ; al iniciar el loop r0 apunta a X(n), r1 apunta a Y(n)

              ; empieza el ciclo
              ; Y(n) = X(n) + X(n-1) * e1 + y(n-1) * e1 * e2 n>=0

              DO     #10,END1

              ;Primer paso a <= X(n)

              move  x:(r0),a
```

```
                ; Segundo paso a += X(n-1) * e1

                move   x:-(r0),x0

                move   #$780000,y0   ; asigno e1=0.5+0.25+0.125+0.0625=0.9375

                mac             y0,x0,a ; realizo a+=x0 * y0

                ; Tercer paso a += Y(n-1) * e1 * e2

                move   x:-(r1),x0
                move   x:(r1)+,x0 ;r1++

                move   #$780000,y0 ; asigno e1
                move   #$780000,y1 ; asigno e2=e1
                mpy             y0,y1,b
                move   b1,y0

                mac             x0,y0,a


                ; Cuarto paso Y(n) = a
                move   a1,x:(r1)

                move   x:(r0)+,a ;r0++
                move   x:(r0)+,a ;r0++
                move   x:(r1)+,a ;r1++

END1

vvv             nop

        end     main
```

Código Python:

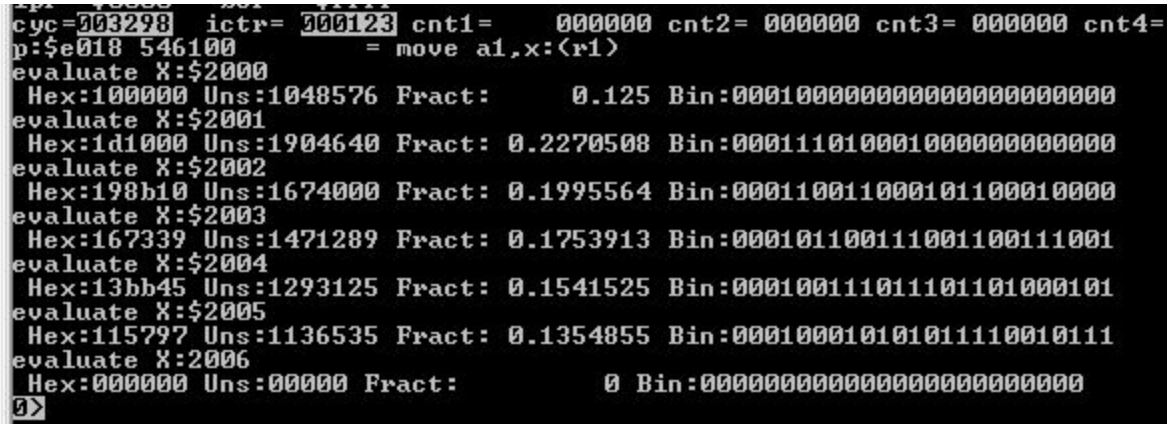
```
from scipy import signal
import matplotlib.pyplot as plt

import numpy
```

```
def generateSystem(e1, e2):
   return signal.dlti([1, e1], [1, -e1*e2], dt=1)


def addPlot(e1, e2):
   input = [0.125]

   for x in range(99):
       input.append(0)

   system = generateSystem(e1, e2)

   x_val_input = [x for x in range(len(input))]

   x_val_output, output = system.output(input, x_val_input)

   plt.plot(x_val_output, output, label = "Values = %d, %d" % (e1, e2))


def computeValues(e1, e2, x_input , input):
   system = generateSystem(e1, e2)

   x_val_output, output = system.output(input, x_input)

   return x_val_output, output


input = [0.125, 0, 0, 0, 0, 0, 0, 0, 0, 0]
x_input = [x for x in range(len(input))]

addPlot(0.9375, 0.9375)

x_val_output, output = computeValues(0.9375, 0.9375, x_input, input)

print(x_input, input)
print(x_val_output, output)


#addPlot(0, 0)
#addPlot(1, 0)
#addPlot(2, 0)
#addPlot(3, 0)
#addPlot(4, 0)

#addPlot(0.999, 0.999)


#addPlot(1, 1)
```

```
plt.legend()
plt.show()
```

Validación:

Codigo DSP:



Código Python:

```
[0. 1. 2. 3. 4. 5. 6. 7. 8. 9.] [[0.125     ]
 [0.22705078]
 [0.19955635]
 [0.17539132]
 [0.15415253]
 [0.13548562]
 [0.11907916]
 [0.10465942]
 [0.09198582]
 [0.08084691]]
```