

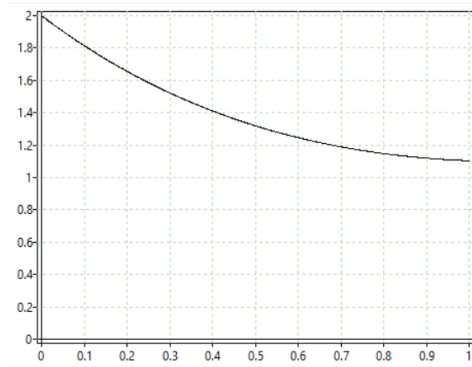
Nombre: Oscar Daniel Ramos Ramirez

Curso: Análisis Numérico

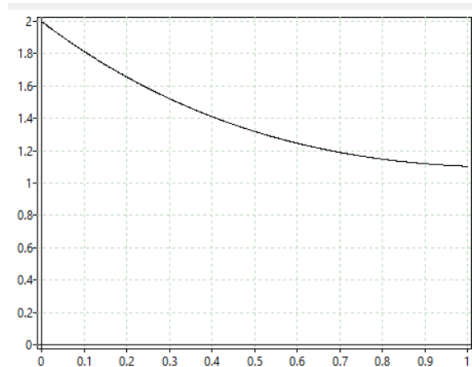
1) $h = 0.001$

1.a) $y(1)$

Euler: 1.10308627

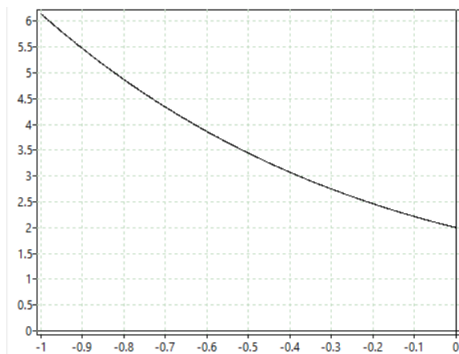


Heun: 1.10363850

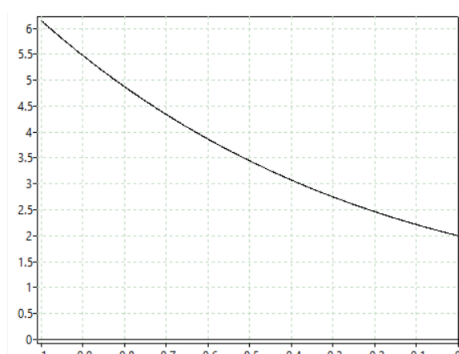


1.b) $y(-1)$

Euler: 6.1507717967

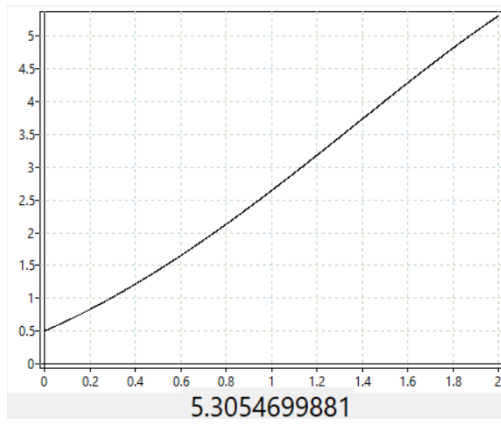


Heun = 6.1531267045

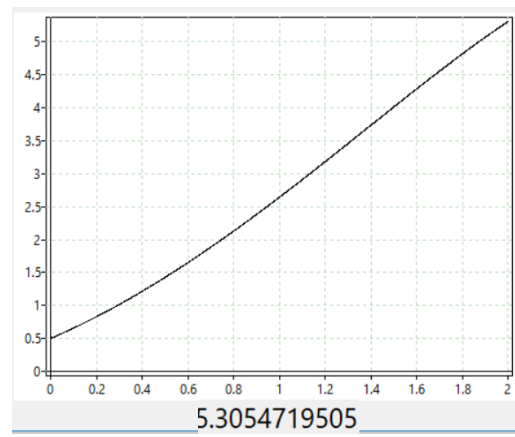


2) $h = 0.001$

Heun

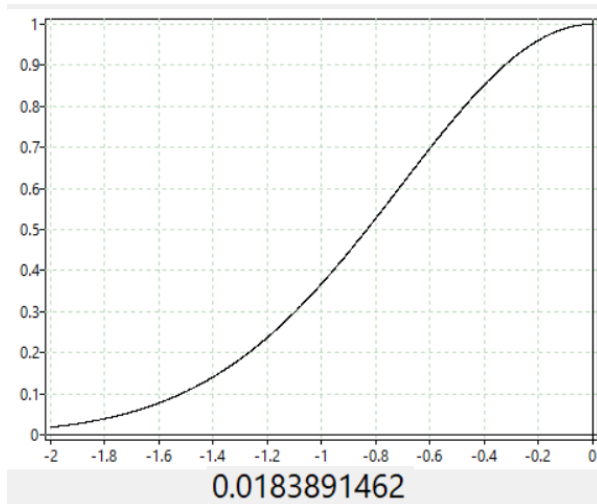


RK4

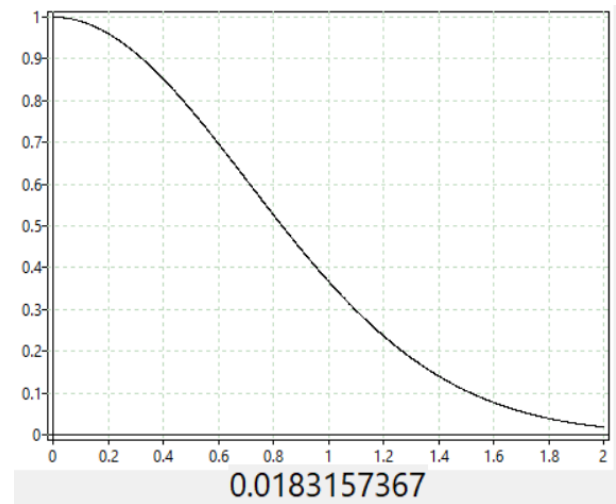


3) $h = 0.001$

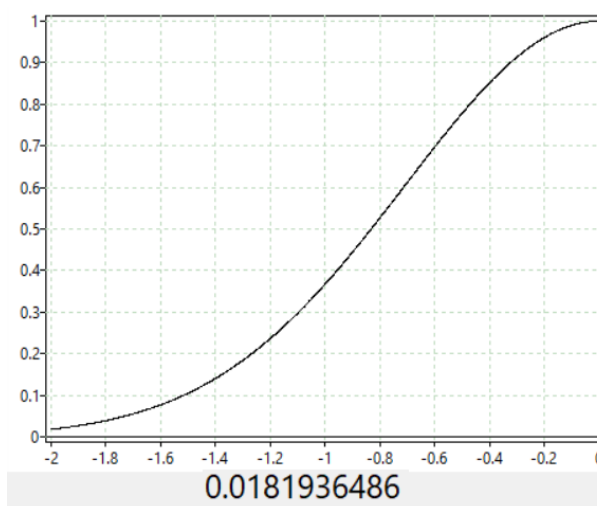
Heun: [-2,0]



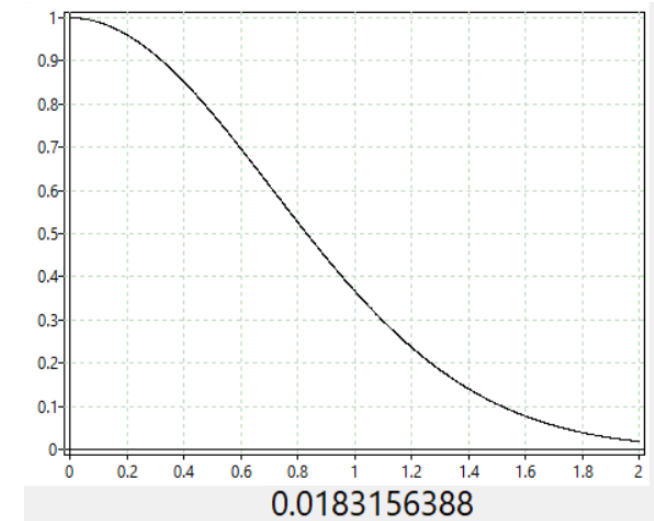
Heun: [0,2]



RK4: [-2;0]

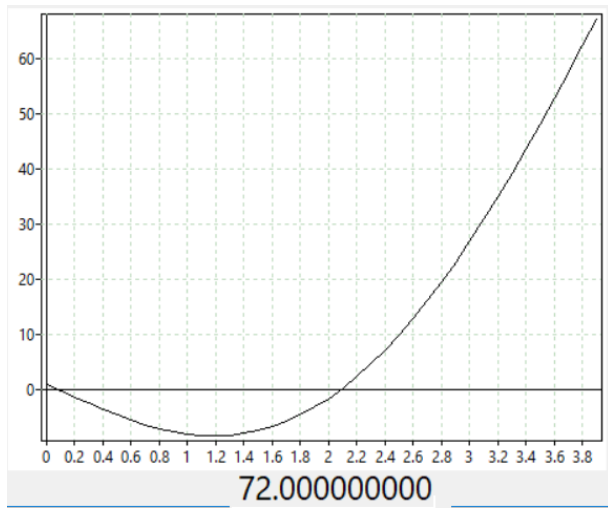


RK4:[0,2]

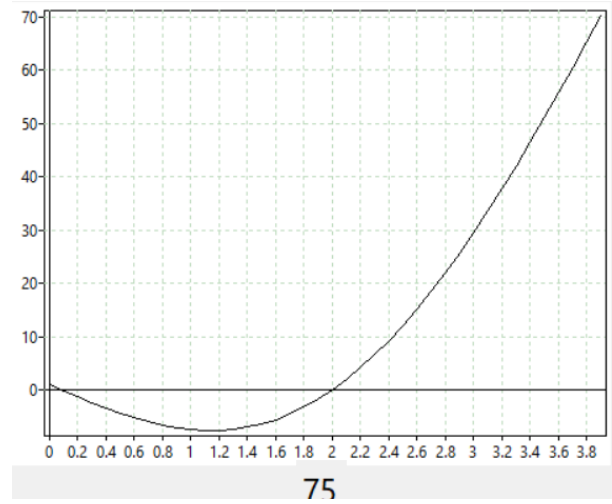


4) $h = 0.1$

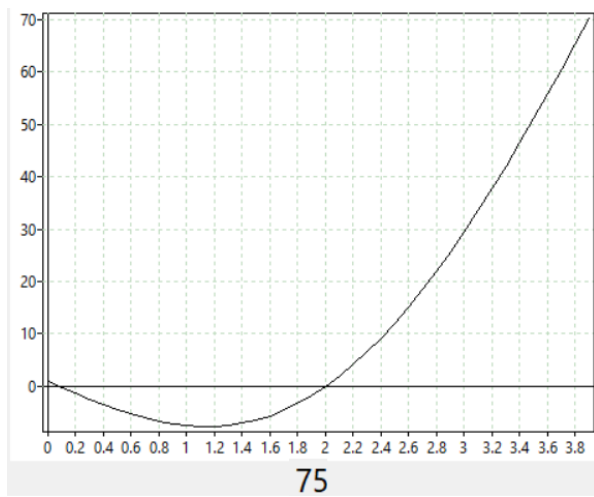
Euler:



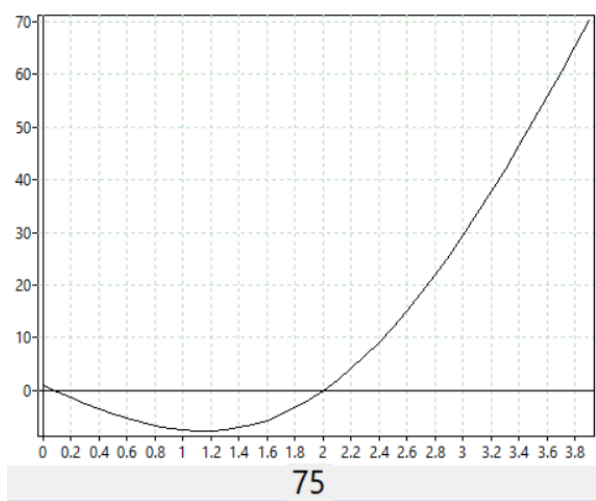
Heun:



RK4:



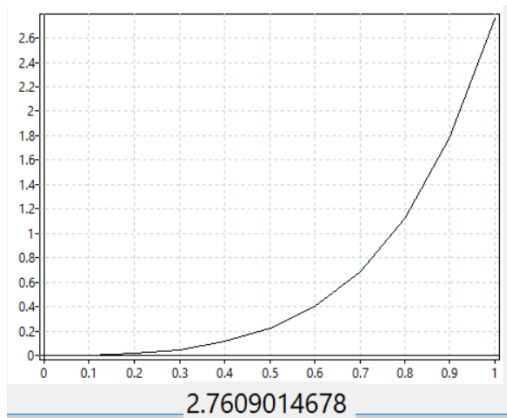
DP:



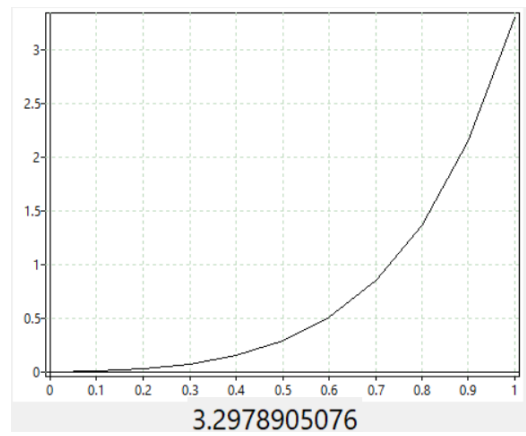
5) $h = 0.1$

5.a)

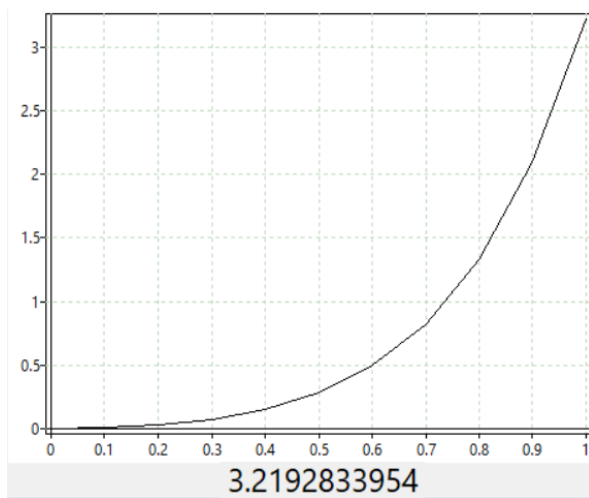
Euler



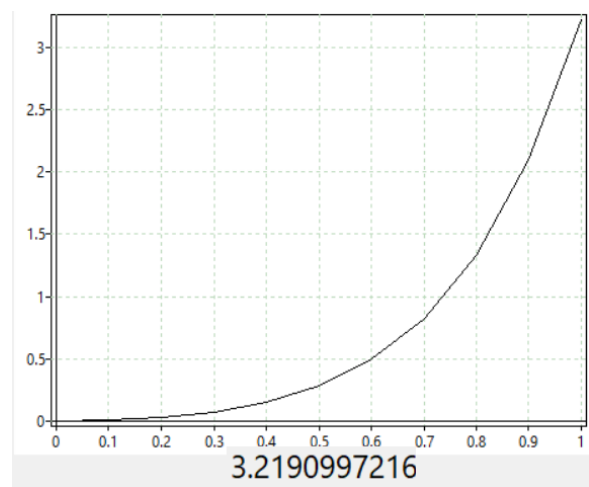
Heun



RK4

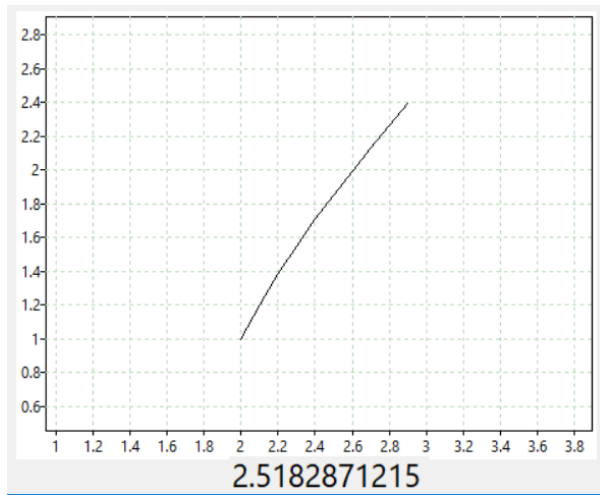


DP

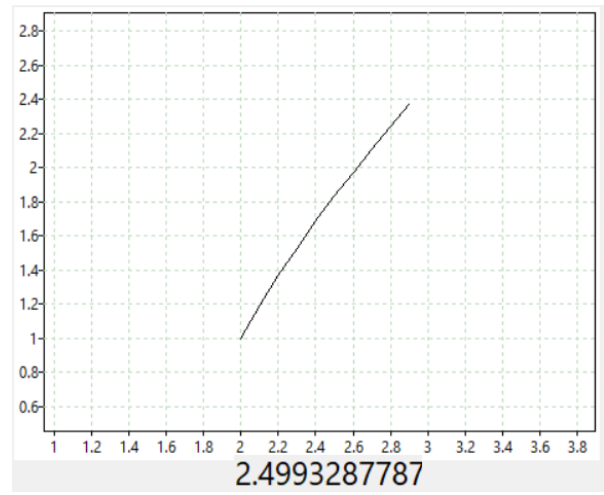


5.b) $h = 0.1$

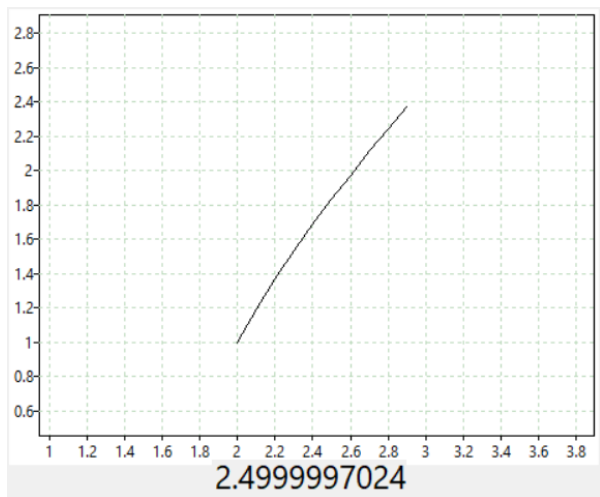
Euler:



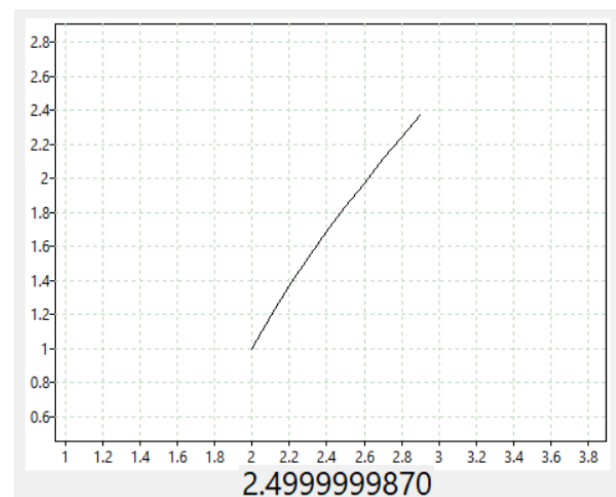
Heuler:



RK4:



DP:

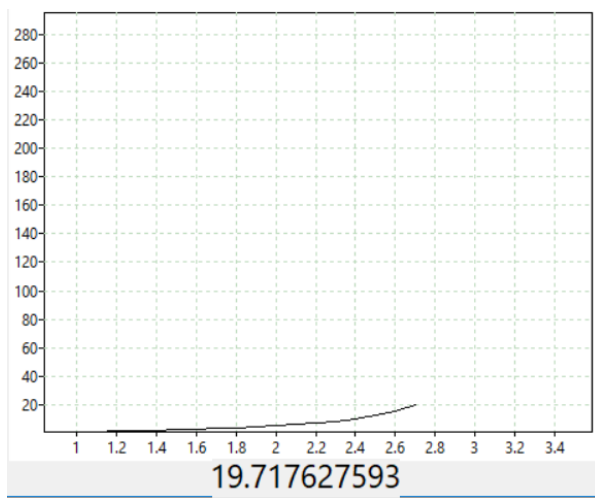


5.c) $h = 0.1$,

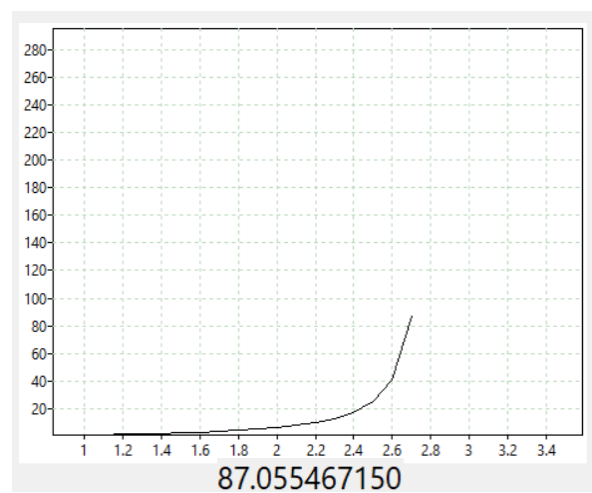
Calculando $[1, 14]$

Tiene un crecimiento exponencial, da lugar a que los algoritmos causen overflow, por eso no se puede gran parte del intervalo $t \in [0, 14]$, voy a mostrar un segmento de este intervalo para mostrar el comportamiento de la función.

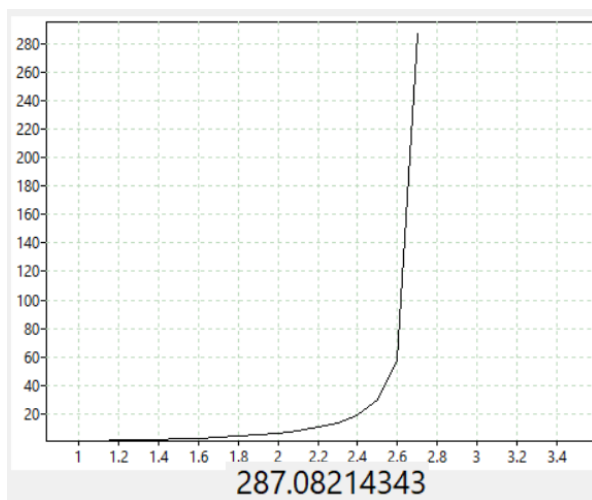
Euler: $[1, 2.8]$



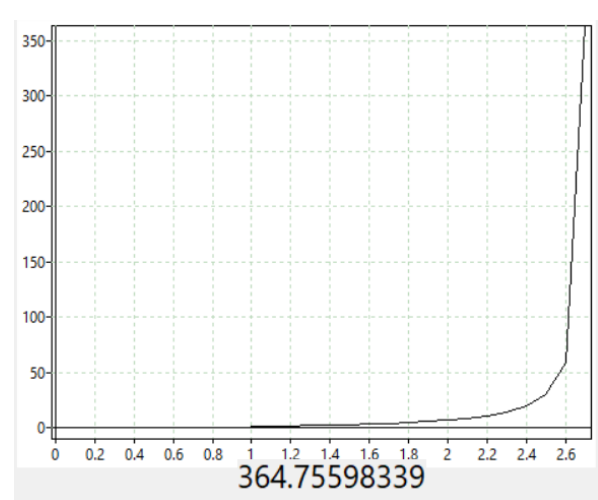
Heun $[1, 2.8]$:



RK4: $[1, 2.8]$



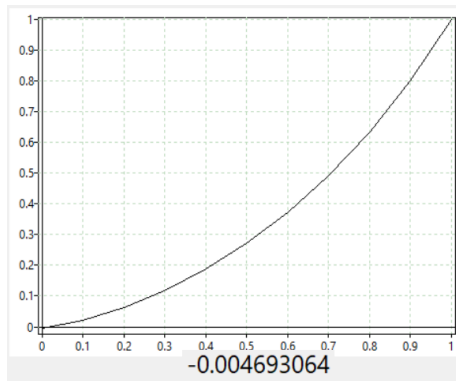
DP: $[1, 2.8]$



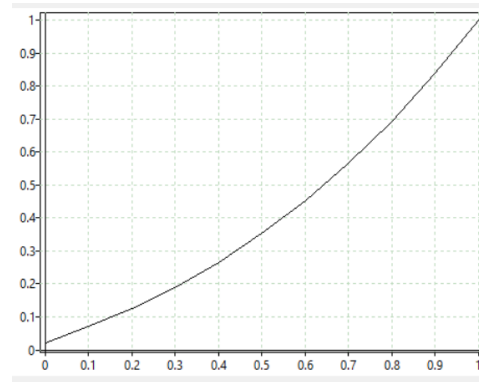
Calculando [-14,1]

Hay una asíntota en 0.01, causando que los métodos fallen en ese punto, voy a calcular hasta -0.09 para mostrar el comportamiento.

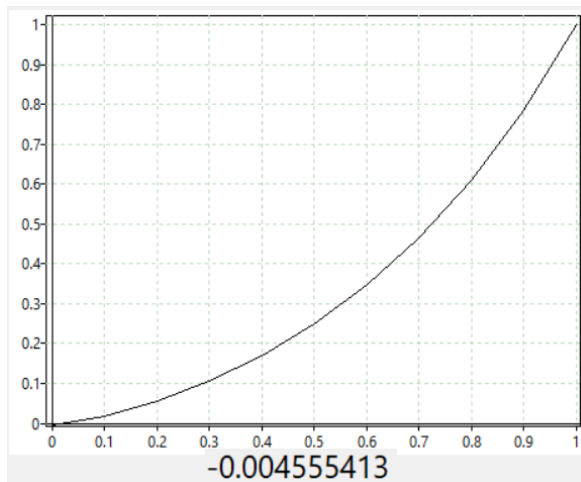
Euler: [-0.09, 1]



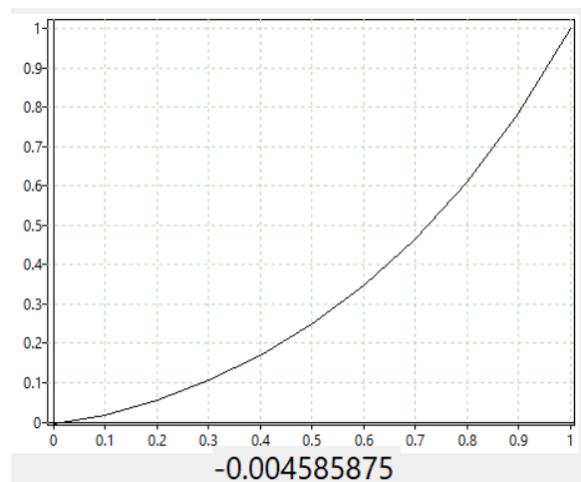
Heun: [-0.09, 1]



RK4: [-0.09, 1]

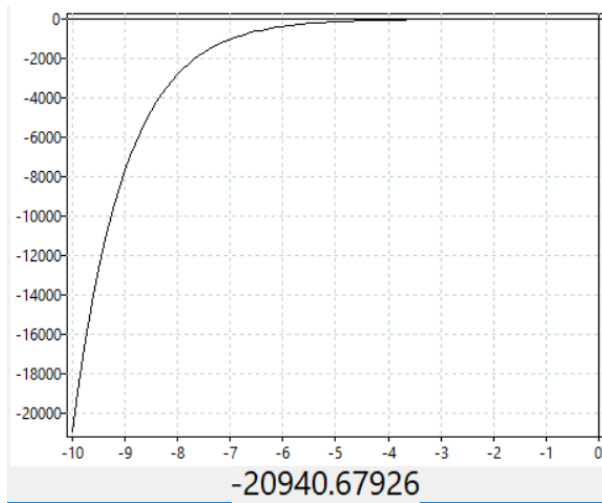


DP: [-0.09, 1]

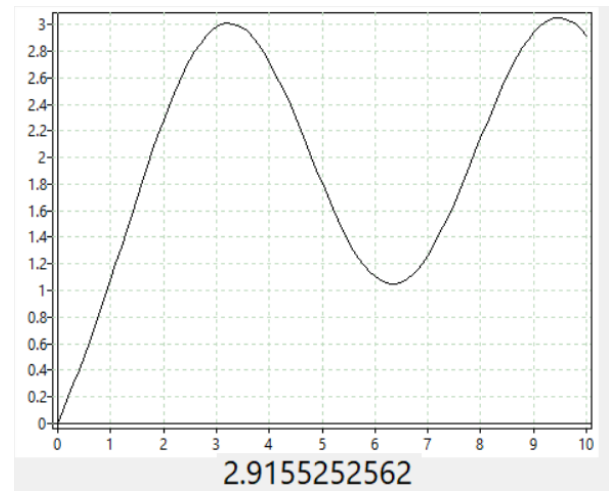


5.d) $h = 0.1$

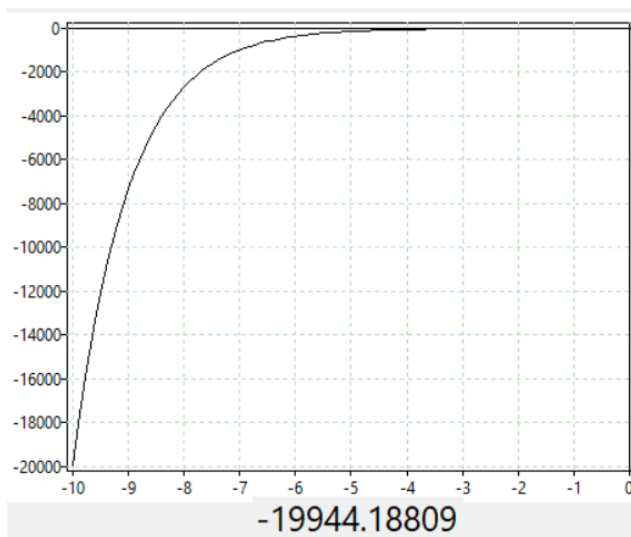
Euler: $[-10, 0]$



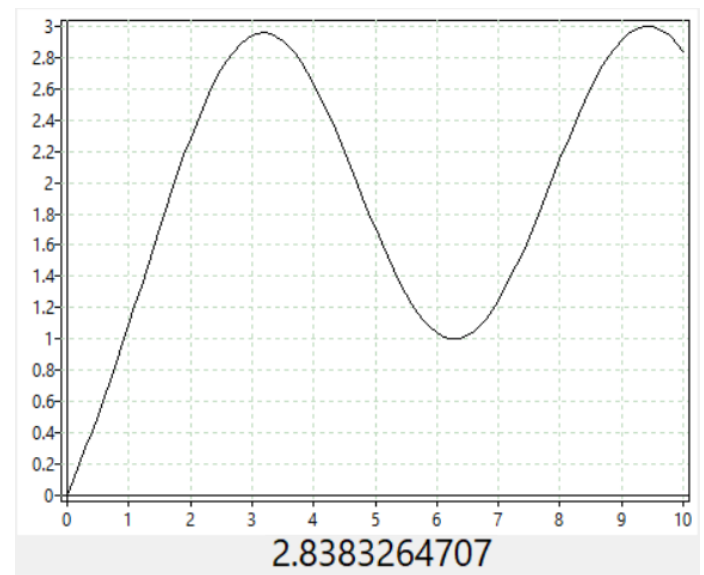
Euler: $[0, 10]$



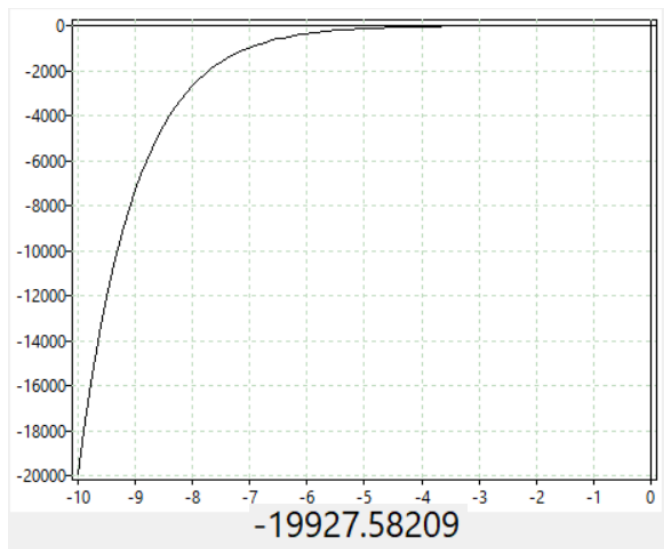
Heun $[-10, 0]$



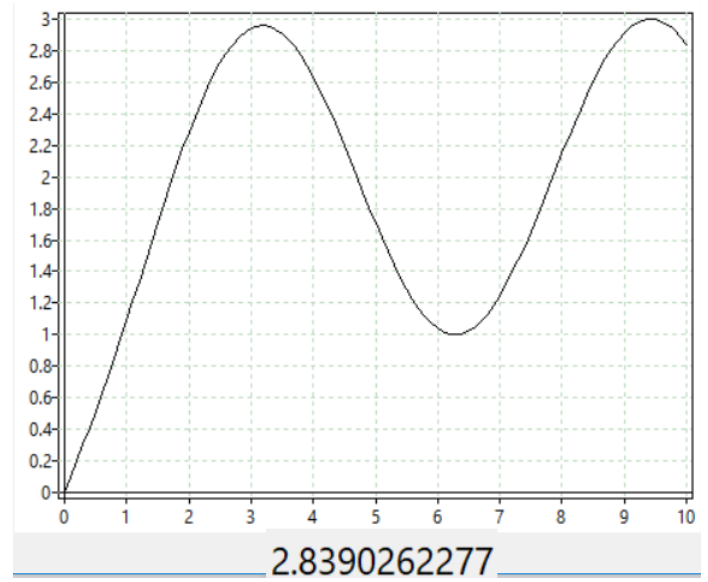
Heun: $[0, 10]$



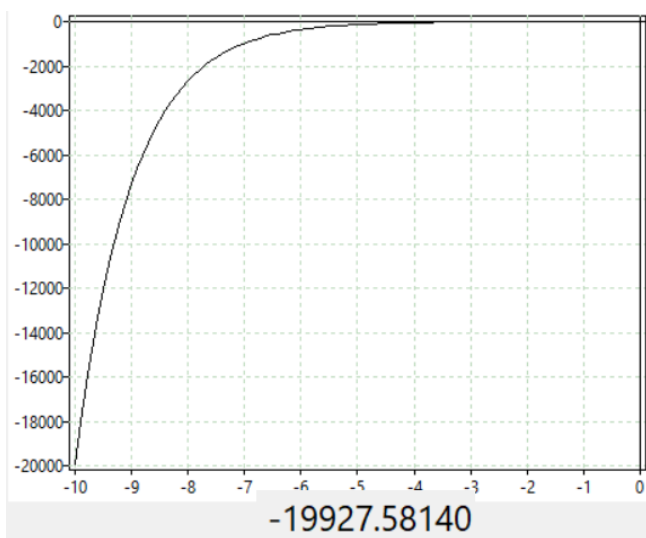
RK4: [-10,0]



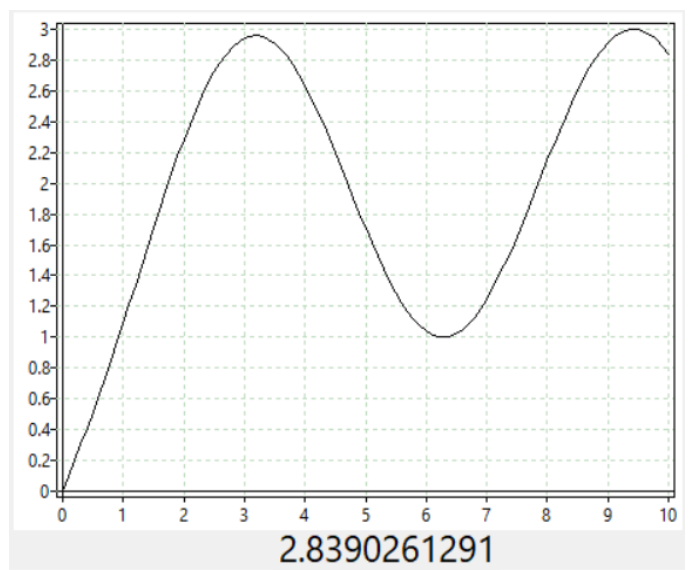
RK4: [0,10]



DP: [-10,0]

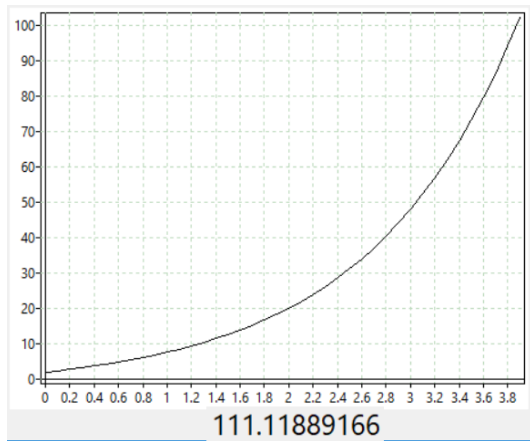


DP: [0,10]

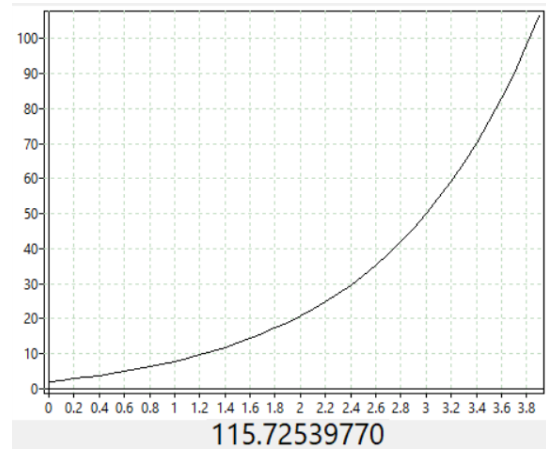


5.e) $h = 0.1$

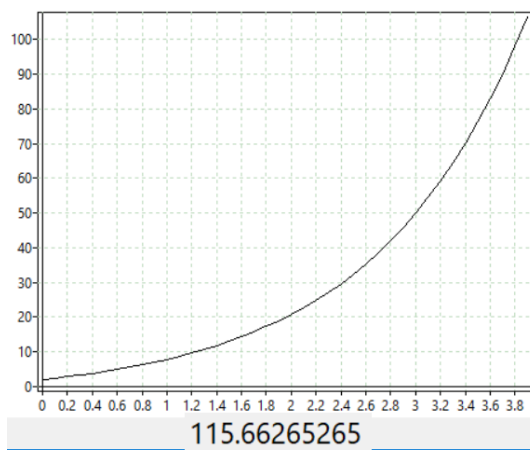
Euler: [0,4]



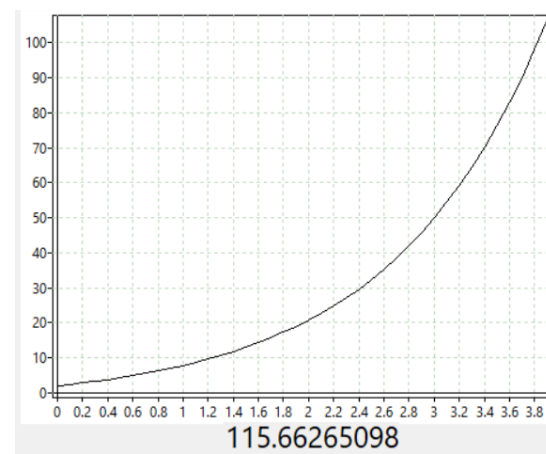
Heun: [0,4]



RK4: [0,4]



DP: [0,4]



También podría poner un h tan pequeño tal que las gráficas sean iguales, luego usar una gráfica para las comparaciones, pero haría que los métodos parezcan iguales, sería como hacer trampa, y no tenga sentido compararlos.