

EJEMPLO

Considere el P.V.I.

$$\begin{cases} y' = y, \\ y(0) = 1, \end{cases},$$

cuya solución exacta es $y(x) = e^x$.

		Euler: $h = 0.1$		Euler: $h = 0.025$		RK4: $h = 0.1$	
x	Sol. Exacta	Sol. Calc.	Error	Sol. Calc.	Error	Sol. Calc.	Error
0.0	1.00000000	1.00000000	0.00	1.00000000	0.00	1.00000000	0.00
0.1	1.10517091	1.10000000	5.17×10^{-3}	1.10381289	1.35×10^{-3}	1.10517083	8.47×10^{-8}
0.2	1.22140275	1.21000000	1.14×10^{-2}	1.21840289	2.99×10^{-3}	1.22140257	1.87×10^{-7}
0.3	1.34985880	1.33100000	1.88×10^{-2}	1.34488882	4.96×10^{-3}	1.34985849	3.10×10^{-7}
0.4	1.49182469	1.46410000	2.77×10^{-2}	1.48450562	7.31×10^{-3}	1.49182424	4.57×10^{-7}
0.5	1.64872127	1.61051000	3.82×10^{-2}	1.63861644	1.01×10^{-2}	1.64872063	6.32×10^{-7}
0.6	1.82211880	1.77156100	5.05×10^{-2}	1.80872594	1.33×10^{-2}	1.82211796	8.38×10^{-7}
0.7	2.01375270	1.94871710	6.50×10^{-2}	1.99649501	1.72×10^{-2}	2.01375162	1.08×10^{-6}
0.8	2.22554092	2.14358881	8.19×10^{-2}	2.20375693	2.17×10^{-2}	2.22553956	1.36×10^{-6}
0.9	2.45960311	2.35794769	0.10	2.43253531	2.70×10^{-2}	2.45960141	1.69×10^{-6}
1.0	2.71828182	2.59374246	0.12	2.68506383	3.32×10^{-2}	2.71827974	2.08×10^{-6}
1.1	3.00416602	2.85311670	0.15	2.96380807	4.03×10^{-2}	3.00416349	2.53×10^{-6}
1.2	3.32011692	3.13842837	0.18	3.27148956	4.86×10^{-2}	3.32011386	3.05×10^{-6}
1.3	3.66929666	3.45227121	0.21	3.61111234	5.81×10^{-2}	3.66929301	3.65×10^{-6}
1.4	4.05519996	3.79749833	0.25	3.98599235	6.92×10^{-2}	4.05519561	4.35×10^{-6}
1.5	4.48168907	4.17724816	0.30	4.39978974	8.18×10^{-2}	4.48168391	5.15×10^{-6}

	Error Euler				
x	$h = 0.2$	$h = 0.1$	$h = 0.05$	$h = 0.025$	$h = 0.0125$
0	0	0	0	0	0
0.2	0.0214027582	0.0114027582	0.00299986065	0.00151321046	0.000759974291
0.4	0.0518246976	0.0277246976	0.00731907698	0.00369418905	0.00185589183
0.6	0.0941188004	0.0505578004	0.0133928508	0.00676394734	0.00339912939
0.8	0.151940928	0.0819521185	0.0217839907	0.0110085179	0.00553388620
1.0	0.229961828	0.124539368	0.0332179901	0.0167968877	0.00844625215
1.2	0.334132923	0.181688546	0.0486273620	0.0246036802	0.0123756810
1.4	0.472019167	0.257701631	0.0692076069	0.0350378080	0.0176294893
1.6	0.653215464	0.358059438	0.0964877836	0.0488786267	0.0246011566
1.8	0.889867112	0.489730151	0.132419402	0.0671215063	0.0337934016
2.0	1.19731968	0.661556150	0.179488283	0.0910352138	0.0458472483

	Error RK ₄₄				
x	$h = 0.2$	$h = 0.1$	$h = 0.05$	$h = 0.025$	$h = 0.0125$
0	0	0	0	0	0
0.2	0.000002758	0.0000001873	0.00000001220	0.0000000007788	4.918×10^{-11}
0.4	0.000006738	0.0000004576	0.00000002981	0.000000001902	0.0000000001201
0.6	0.00001234	0.0000008383	0.00000005462	0.000000003485	0.0000000002201
0.8	0.00002010	0.000001365	0.00000008895	0.000000005676	0.0000000003585
1.0	0.00003069	0.000002084	0.0000001358	0.000000008666	0.0000000005473
1.2	0.00004498	0.000003055	0.0000001990	0.00000001270	0.0000000008022
1.4	0.00006410	0.000004353	0.0000002836	0.00000001810	0.000000001143
1.6	0.00008948	0.000006077	0.0000003959	0.00000002527	0.000000001596
1.8	0.0001230	0.000008350	0.0000005440	0.00000003472	0.000000002192
2.0	0.0001669	0.00001133	0.0000007383	0.00000004711	0.000000002975