Informe Laboratorio: Análisis Numérico
Práctica No. 10

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3.2 Applying

A.

$$Y' = e^{-2t} - 2y$$

$$y(0) = \frac{1}{10}; \quad y(t) = \frac{1}{10}e^{-2t} + te^{-2t}$$

h=0.2

$$f_1 = e^{-2(0)} - 2(\frac{1}{10}) = 0{,}8$$

$$f_2 = e^{-2(0{,}1)} - 2(\frac{1}{10} + 0{,}2(0{,}5)(0{,}8)) = 0{,}458730$$

$$f_3 = e^{-2(0{,}1)} - 2(\frac{1}{10} + 0{,}2(0{,}5)(0{,}458730)) = 0{,}526984$$

$$f_4 = e^{-2(0{,}1)} - 2(\frac{1}{10} + 0{,}2(0{,}526984)) = 0{,}259526$$

$$y = \frac{1}{10} + 0{,}2(\frac{0{,}8 + 2(0{,}458730) + 2(0{,}526984) + 0{,}259526}{6})$$

y=0.2010318

h=0.1

$f_1 = e^{-2(0)} - 2(\frac{1}{10}) = 0{,}8$

$f_2 = e^{-2(0{,}05)} - 2(\frac{1}{10} + 0{,}1(0{,}5)(0{,}8)) = 0{,}624837$

$f_3 = e^{-2(0{,}05)} - 2(\frac{1}{10} + 0{,}1(0{,}5)(0{,}624837)) = 0{,}642553$

$f_4 = e^{-2(0{,}1)} - 2(\frac{1}{10} + 0{,}1(0{,}642553)) = 0{,}49026$

$y = \frac{1}{10} + 0{,}2(\frac{0{,}8 + 2(0{,}624837) + 2(0{,}642553) + 0{,}49026}{6})$

y=0.63744

y(0.4)

$y = \frac{1}{10} + e^{-2(0{,}4)} + (0{,}4)e^{-2(0{,}4)} = 0{,}062906$

h=0.2

$f_1 = e^{-2(0{,}4)} - 2(0{,}062906) = 0{,}323516$

$f_2 = e^{-2(0{,}5)} - 2(0{,}062906 + 0{,}2(0{,}5)(0{,}323516)) = 0{,}177364$

$f_3 = e^{-2(0{,}5)} - 2(0{,}062906 + 0{,}2(0{,}5)(0{,}177364)) = 0{,}206594$

$f_4 = e^{-2(0{,}2)} - 2(0{,}062906 + 0{,}2(0{,}206594)) = 0{,}46187$

$y = 0{,}062906 + 0{,}2(\frac{0{,}323516 + 2(0{,}177364) + 2(0{,}206594) + 0{,}46187}{6})$

y=0.114687

h=0.1

$f_1 = e^{-2(0{,}4)} - 2(0{,}062906) = 0{,}322516$

$f_2 = e^{-2(0,45)} - 2(0,062906 + 0,1(0,5)(0,322516)) = 0,248406$

$f_3 = e^{-2(0,45)} - 2(0,062906 + 0,1(0,5)(0,248406)) = 0,255917$

$f_4 = e^{-2(0,4)} - 2(0,062906 + 0,1(0,255917)) = 0,641735$

$y = 0,062906 + 0,1(\frac{0,323516 + 2(0,248406) + 2(0,255917) + 0,641735}{6})$

y=0.094994

B.

Euler

$M^1 = e^{-t} - M; \quad h = 0,2; \quad t = 1; \quad M(0) = 300$

$y_1 = 300 + 0,2(e^{-0} - 300) = 240,2$

$y_2 = 240,2 + 0,2(e^{-0,2} - 240,2) = 192,323746$

$y_3 = 192,323746 + 0,2(e^{-0,4} - 192,323726) = 153,993060$

$y_4 = 153,993060 + 0,2(e^{-0,6} - 153,993060) = 128,30421$

$y_5 = 128,30421 + 0,2(e^{-0,8} - 128,30421) = 98,73323$

$y_6 = 98,73323 + 0,2(e^{-1} - 98,73323) = 79,060162$

Heun

$y_1 = 300 + 0,2(e^{-0} - 300) = 240,2$

$y_2 = 300 + 0,1(e^{-300} - 240,2) = 192,3533642$

$y_3 = 300 + 0,1(e^{-240,2} - 192,3533642) = 153,903161$

$y_4 = 300 + 0,1(e^{-192,3533642} - 153,903161) = 125,995321$

$y_5 = 300 + 0{,}1(e^{-153{,}903161} - 125{,}995321) = 98{,}954121$

$y_6 = 300 + 0{,}1(e^{-125{,}995321} - 98{,}954121) = 79{,}091375$