CS-201

Computational Physics

Lab-1

07 . 02 . 2020

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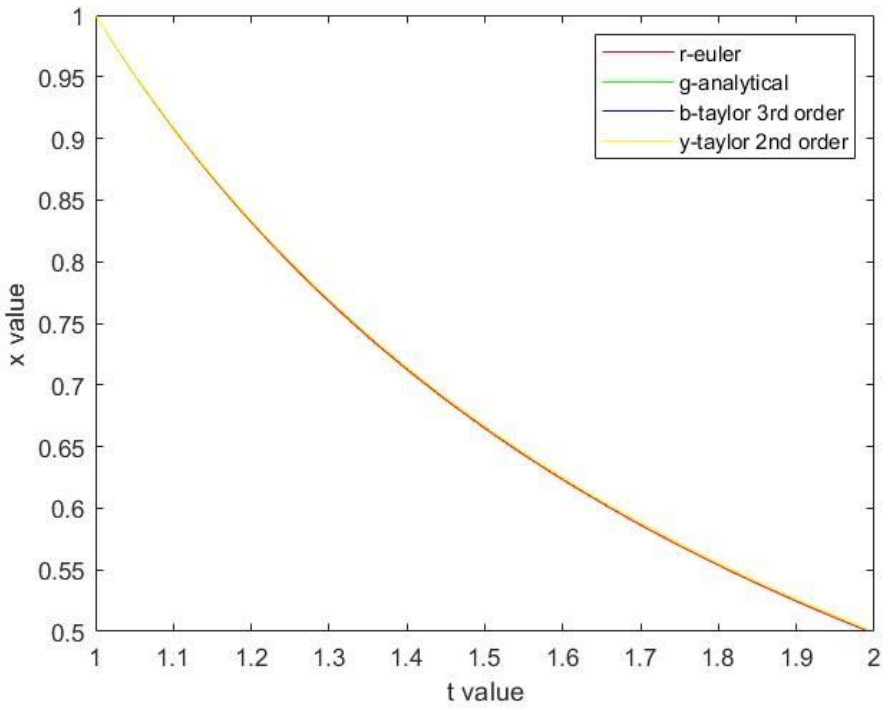
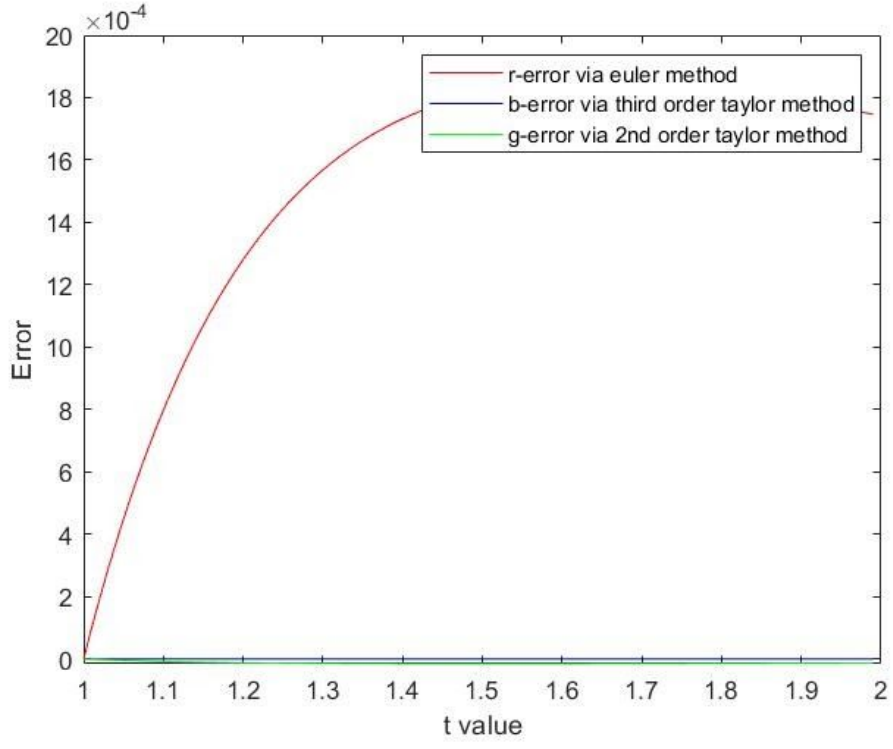
1 Euler, Taylor second order and Taylor third order Plots

1.1 $f(x) = -x^2$; $x(0) = 1$; $0 \leq t \leq 2$, $\Delta t = 0.01$

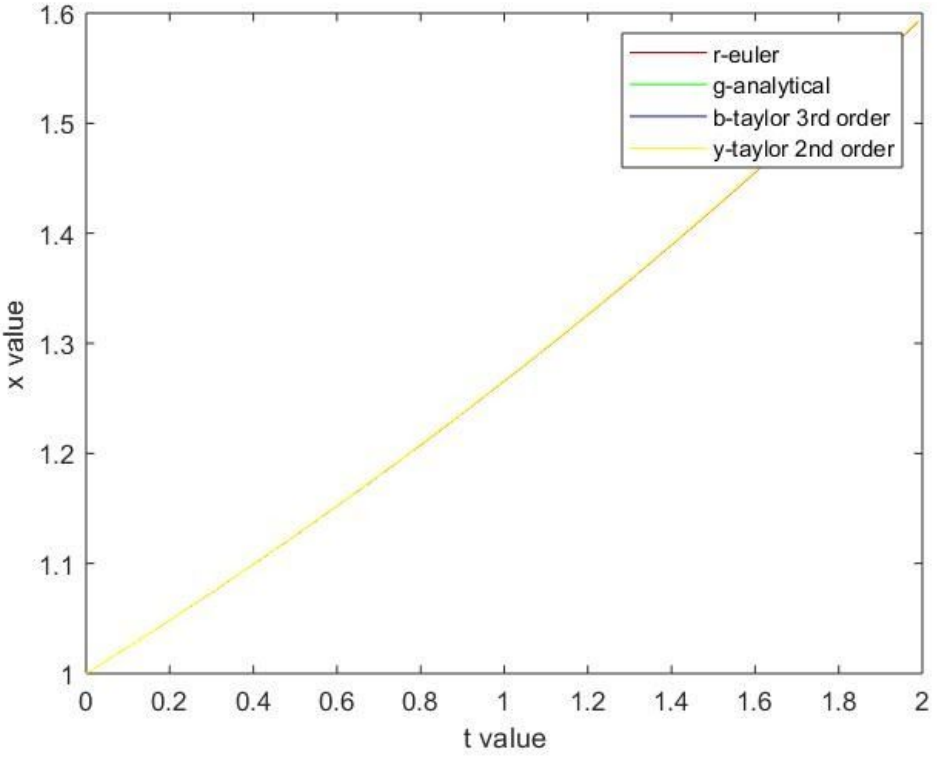
Analytical solution : $x(t) = 1/t$

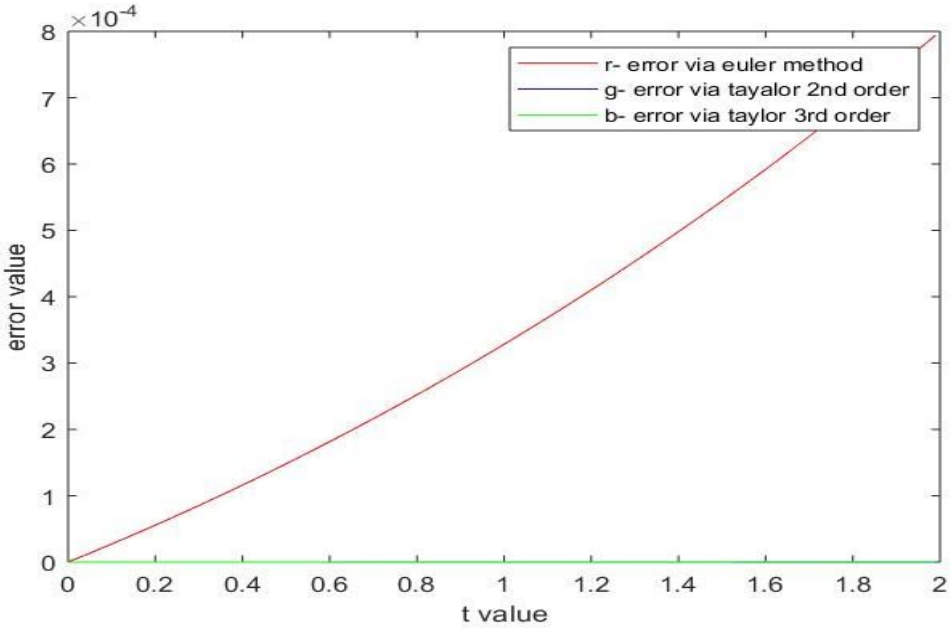




1.2 *f(x) = 0.25x (1 - 0.05x) ; x(0)=1 ; $0 \leq t \leq 2$, $\Delta t = 0.01$*

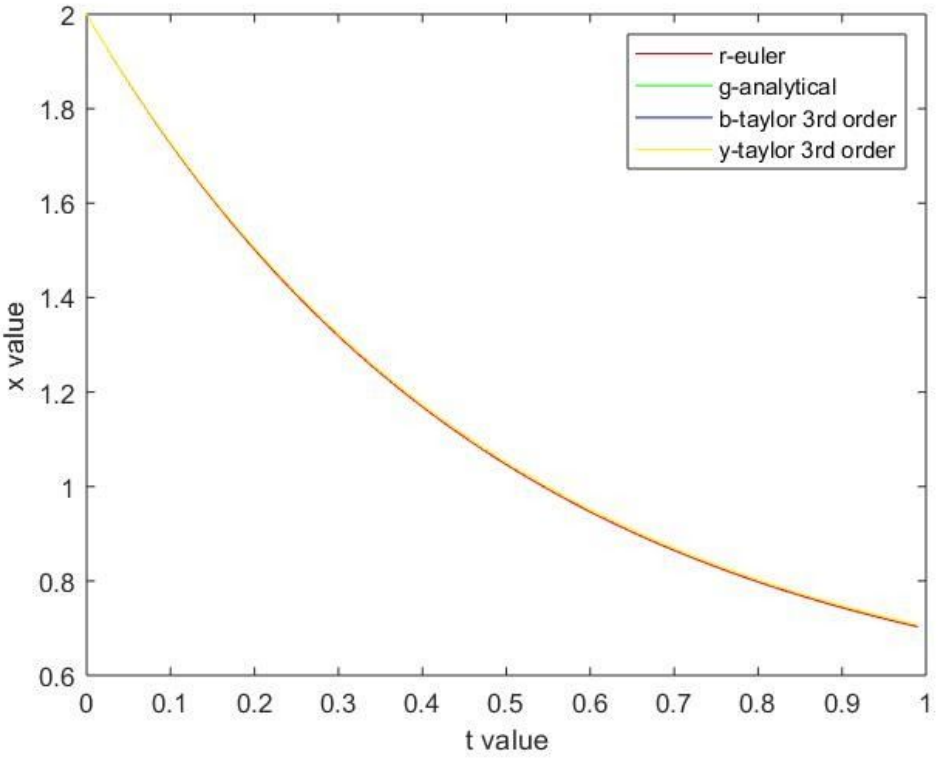
Analytical Solution : $x(t) = e^{0.25t}/(0.95 + 0.05e^{0.25t})$

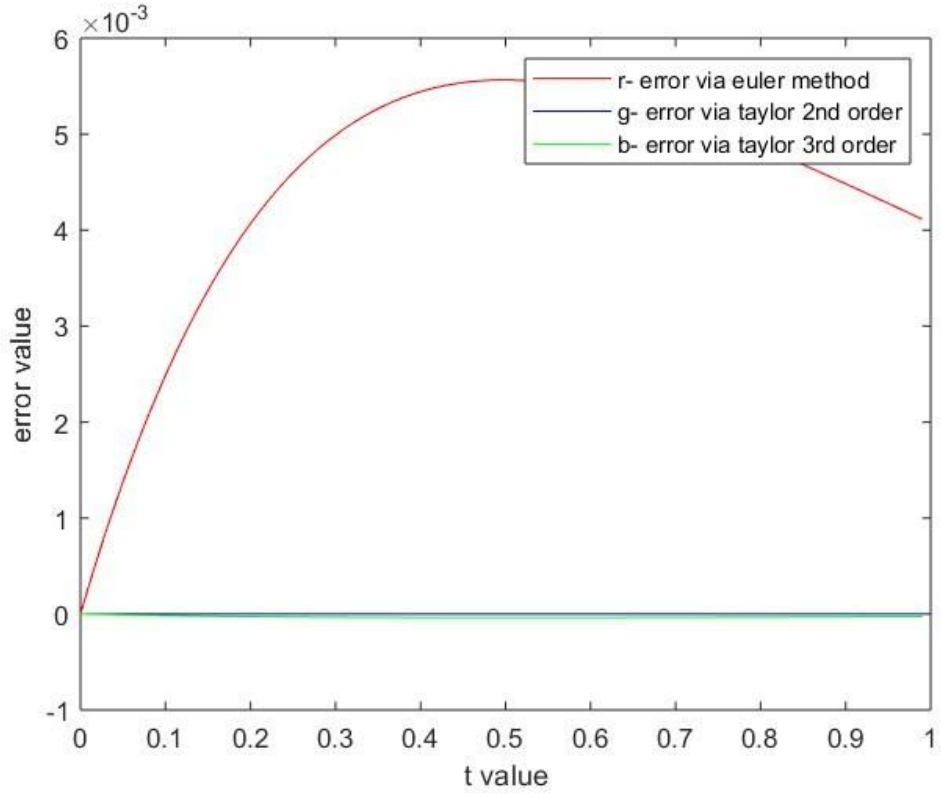




1.3 *f(x) = 1-2x ; x(0)=2 ; $0 \leq t \leq 1$, $\Delta t = 0.01$*

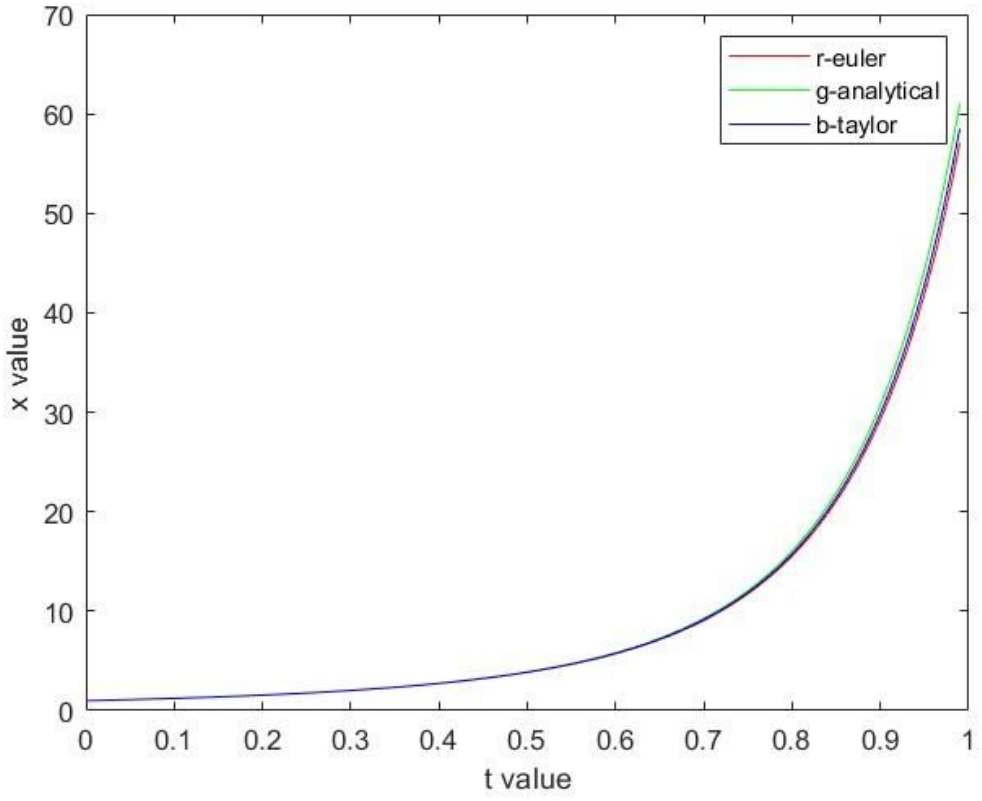
Analytical Solution : $x(t) = 1.5e^{-2t} + 0.5$

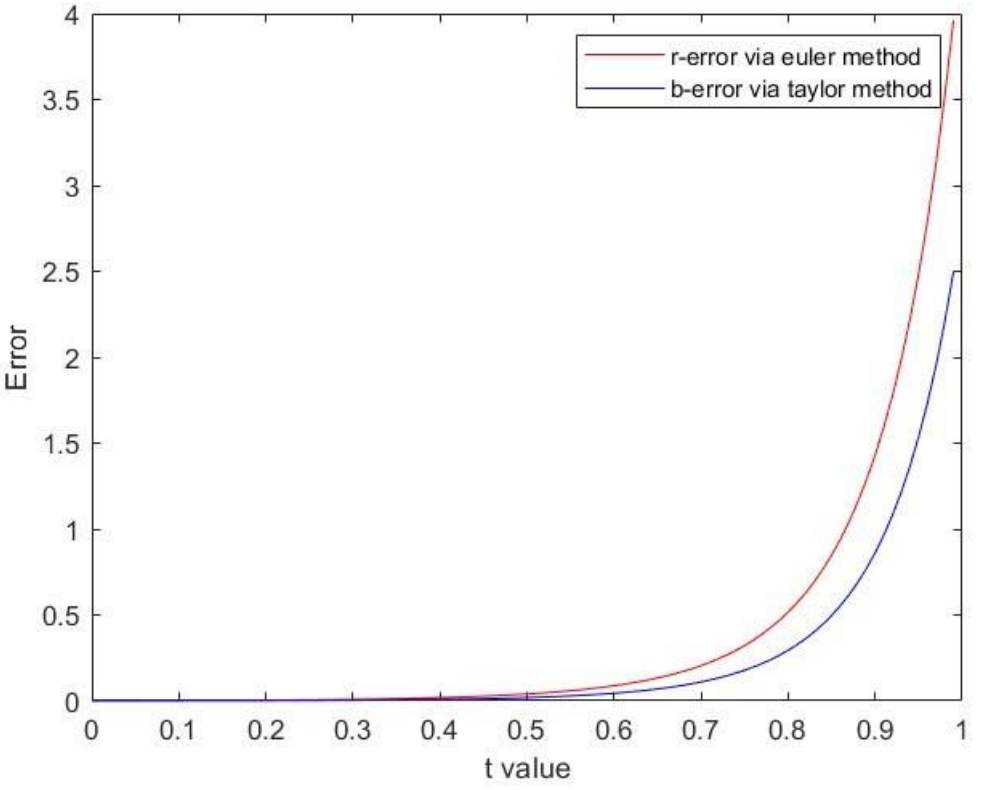




1.4 *$f(x) = x(1 + e^{2t})$; $x(0)=1$; $0 \leq t \leq 2$, $\Delta t = 0.01$*

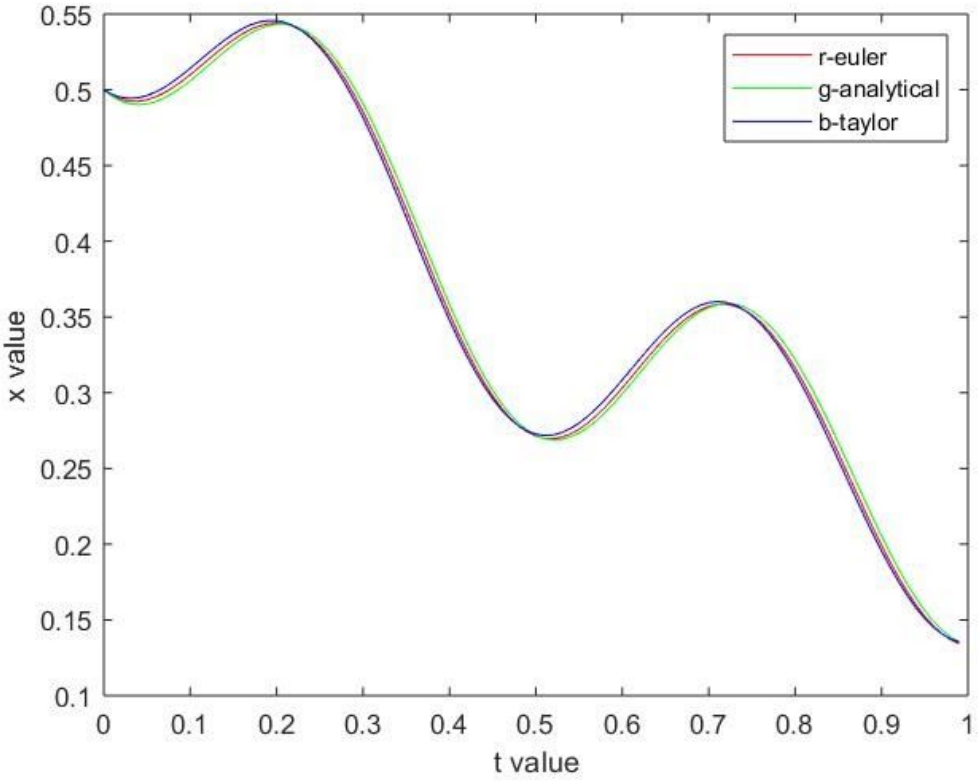
Analytical Solution : $x(t) = e^{-0.5 + t + 0.5 (e^{2t})}$

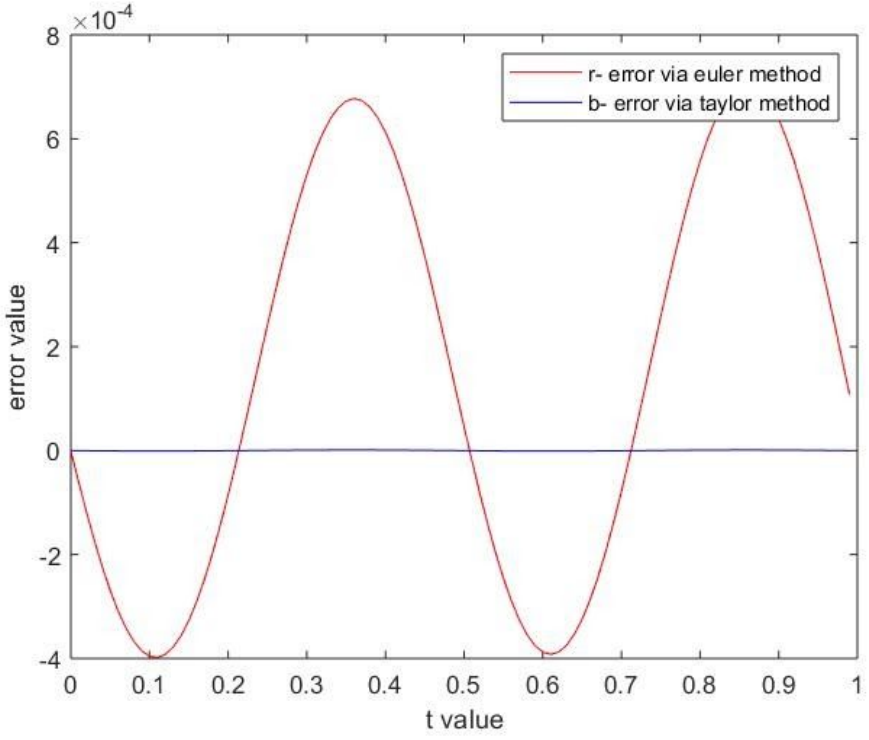




1.5 *f(x) = -x + sin(4Πt) ;* *x(0)=1* *;* *0 ≤ t ≤ 2 ,* *△t = 0. 01*

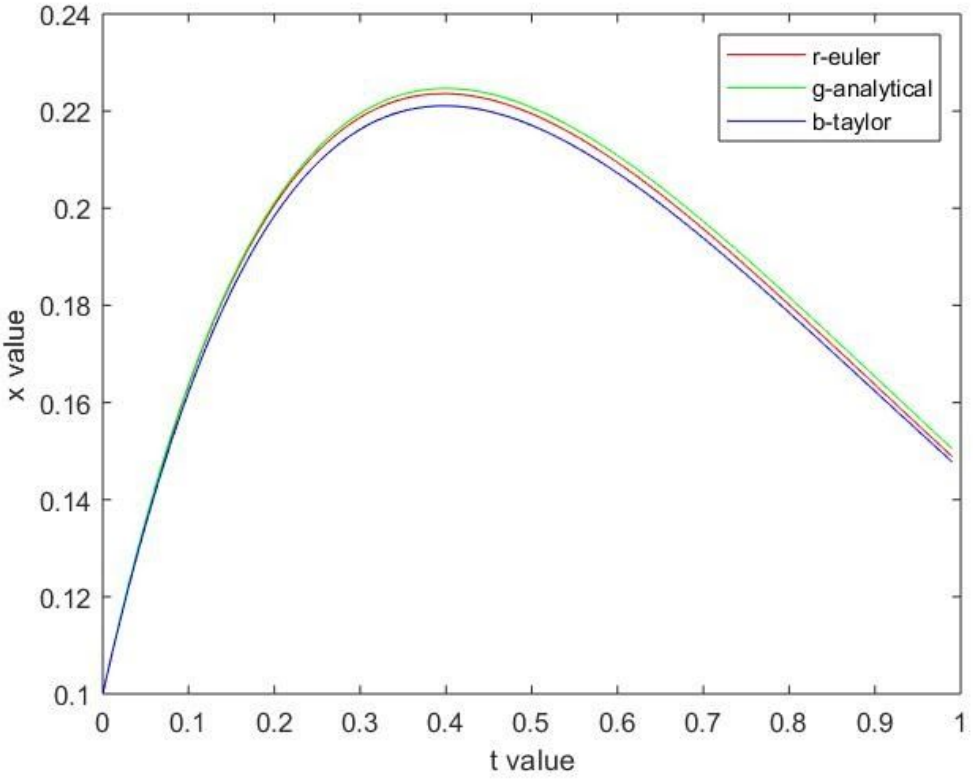
Analytical Solution : $x(t) = \frac{\sin(4\Pi t) - 4\Pi\cos(4\Pi t) + (0.5 + 8\Pi^2 + 4\Pi)e^{-t}}{1+16\Pi^2}$

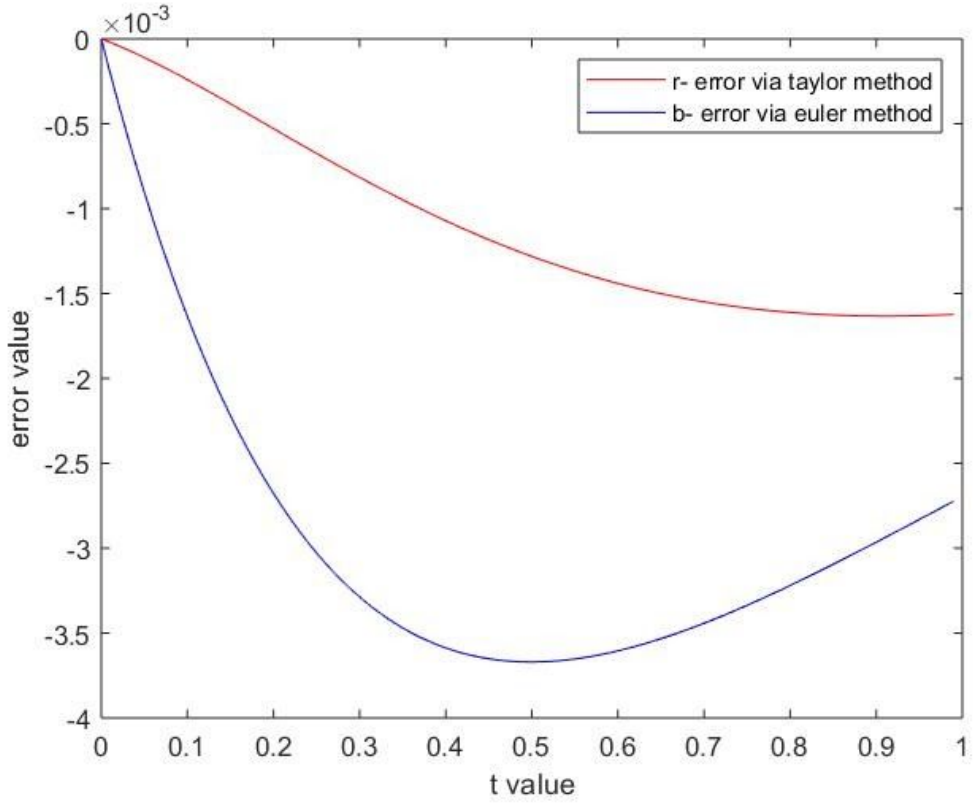




1.6 $f(x) = -2x + e^{-2t}$; $x(0)=0.1$; $0 \leq t \leq 1$, $\Delta t = 0.01$

Analytical Solution : $x(t) = e^{-2t}(t + 0.1)$





1.7 $f(x) = t^2 - x$; $x(0)=1$; $0 \leq t \leq 1$, $\Delta t = 0.01$

Analytical Solution : $x(t) = t^2 - 2t + 2 - e^{-t}$