

Consider the initial value problem in $[0, 1]$ given by

$$(a) \frac{dx}{dt} = \frac{x}{2t+1}, x(0) = 1. \quad (b) \frac{dx}{dt} = -10x, x(0) = 1.$$

1. Using the R-code `euler.R` in the dropbox folder perform the Euler's method for (a) and (b) with stepsize $h = \frac{1}{2}, \frac{1}{5}, \frac{1}{10}$. For (a): one figure plot the true solution, the linear-interpolated solution given by Euler's method for each of the three step sizes. Do the same for (b).
2. Do the same as in previous part using the R-code `midpoint.R` in the dropbox folder and perform the Midpoint method for (a) and (b).
3. Do the same as in previous part using the R-code `rungekutta4.R` in the dropbox folder and perform the Rungekutta-order4 method for (a) and (b).