

Now let's qualitatively compare the exact to the approx. solution:

(i) $\lambda > 0$: $y(t)$ increases

y_j ? increases \checkmark .

(ii) $\lambda < 0$: $y(t)$ decreases

y_j ? depends on the step size h : $\alpha h < \frac{2}{|\lambda|}$

Let's apply IE to the same IVP

$$y_{j+1} = y_j + h \cdot f(t_{j+1}, y_{j+1})$$

$$= y_j + h\lambda \cdot y_{j+1}$$

(solve for y_{j+1})
IMPLICIT!

$$y_{j+1} = \frac{\lambda}{\lambda - h\lambda} y_j$$

$$y_j = \frac{\lambda}{\lambda - h\lambda} y_{j-1}$$

$$= \left(\frac{\lambda}{\lambda - h\lambda} \right)^2 y_{j-2}$$

\vdots

$$= \left(\frac{\lambda}{\lambda - h\lambda} \right)^{j+1} y_0$$