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

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

y_j ? increases ✓.

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

y_j ? depends on the step size h: $0 < h < \frac{2}{|\lambda|}$

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!)

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

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

$$= \left(\frac{1}{1-h\lambda}\right)^2 y_{j-1}$$

$$\vdots$$

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