

9.03*

söndag 3 mars 2024

17:05

$$y'' + 3y' - 5y = \cos t$$

$$y(0) = 1, y'(0) = 2$$

$$u_1 = y \quad u_2 = y'$$

$$y' = \frac{5}{3}y + \frac{\cos t}{3} - \frac{1}{3}y''$$

$$y'' = 5y + \cos t - 3y'$$

$$\frac{du_2}{dt} = -3u_2 + 5u_1 + \cos t, \quad u_2(0) = 2$$

$$\frac{du_1}{dt} = \frac{5}{3}u_1 + \frac{\cos t}{3} - \frac{1}{3}\frac{du_2}{dt} =$$

$$= \frac{5}{3}u_1 + \frac{\cos t}{3} - \frac{1}{3}(-3u_2 + 5u_1 + \cos t) =$$

$$= u_2, \quad u_1(0) = 1$$

$$\begin{cases} \frac{du_1}{dt} = u_2, & u_1(0) = 1 \\ \frac{du_2}{dt} = -3u_2 + 5u_1 + \cos t, & u_2(0) = 2 \end{cases}$$

$$\frac{du}{dt} = Au + f, \quad u(0) = a$$

$$A = \begin{bmatrix} 0 & 1 \\ 5 & -3 \end{bmatrix} \quad f = \begin{bmatrix} 0 \\ \cos t \end{bmatrix}$$

$$a = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$