

$$\begin{bmatrix} 6 \\ 3 \end{bmatrix}$$

$\int \sin x \, dx$

$x \quad x \quad x \quad x$

x

$-2x + 21 \rightarrow 23$

$$\begin{bmatrix} 3 & 1 \\ 0 & 0 \end{bmatrix} \quad N_1 = 3, N_2 = -5 \quad -\frac{1}{3} \quad 5 \quad \begin{bmatrix} -\frac{1}{3} \\ 1 \end{bmatrix}$$

$x \quad x$

model. $x(t) = c_1 v_1 e^{\lambda_1 t} + c_2 v_2 e^{\lambda_2 t} + c_3 v_3 e^{\lambda_3 t}$

① $\begin{cases} x_1' = x_1 + 2x_2 \\ x_2' = 2x_1 + x_2 \end{cases} = x' = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} x$

BOOK 2 BOOK 3

$$(A - \lambda I) = \begin{vmatrix} 1-\lambda & 2 \\ 2 & 1-\lambda \end{vmatrix} = (1-\lambda)(1-\lambda) - 4 = 1 - 2\lambda + \lambda^2 - 4 = \lambda^2 - 2\lambda - 3 \rightarrow (\lambda - 3)(\lambda + 1)$$

$\lambda_1 = -1, \lambda_2 = 3$

CASE 1: $\lambda = -1$

$$\begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix} = v_1 = -5 = v_2 = 5 = v_1 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$$

CASE 2: $\lambda = 3$

$$\begin{bmatrix} -2 & 2 \\ 2 & -2 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 0 & 0 \end{bmatrix} = v_1 = 5 = v_2 = -5 = v_2 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$x(t) = c_1 \begin{bmatrix} -1 \\ 1 \end{bmatrix} e^{-t} + c_2 \begin{bmatrix} 1 \\ 1 \end{bmatrix} e^{3t}$$

General soln:

$$x_1(t) = -c_1 e^{-t} + c_2 e^{3t}$$

$$x_2(t) = c_1 e^{-t} + c_2 e^{3t}$$

* Book shows these swapped

my $x_1(t)$ is books $x_2(t)$

and my $x_2(t)$ is books $x_1(t)$