

Inleveropdracht III

2.11. b1.

$$\begin{cases} y''' - y' = 1 \\ y(0) = 1, y'(0) = 0, y''(0) = -1 \end{cases}$$

$$\textcircled{1} \quad \mathcal{L}y''' - \mathcal{L}y' = \mathcal{L}1 = \frac{1}{s}$$

$$\textcircled{2} \quad s^3 \mathcal{L}y - s^2 y(0) - s y'(0) - y''(0) - s \mathcal{L}y + y(0) = \frac{1}{s}$$

$$\textcircled{11} \quad s^3 \mathcal{L}y - s^2 + 1 - s \mathcal{L}y + 1 = \frac{1}{s}$$

$$(s^3 - s) \mathcal{L}y + 2 - s^2 = \frac{1}{s}$$

$$(s^3 - s) \mathcal{L}y = \frac{1}{s} + s^2 - 2 = \frac{1 + s^3 - 2s}{s} = \frac{(s-1)(s^2 + s - 1)}{s}$$

$$\mathcal{L}y = \frac{(s-1)(s^2 + s - 1)}{s^2(s^2 - 1)} = \frac{s^2 + s - 1}{s^2(s+1)}$$

$$\textcircled{2} \quad = \frac{2s-1}{s^2} - \frac{1}{s+1} = \frac{2}{s} - \frac{1}{s^2} - \frac{1}{s+1}$$

$$\textcircled{2} \quad y(x) = 2 - x - e^{-x}$$

18

Check

$$\begin{aligned} g' &= -1 + e^{-x} \\ g'' &= -e^{-x} \\ g''' &= e^{-x} \end{aligned}$$

$$g''' - g' = 1$$

$$y(0) = 2 - 0 - 1 = 1$$

$$y'(0) = -1 + 1 = 0, \quad y''(0) = -1$$