2E2 Tutorial Sheet 4 First Term¹

31 Ocother 2003

1. (2) Use Laplace transform methods to solve the differential equation

$$f'' + 2f' - 3f = \begin{cases} 1, & 0 \le t < c \\ 0, & t \ge c \end{cases}$$
(1)

subject to the initial conditions f(0) = f'(0) = 0.

2. (3) Use Laplace transform methods to solve the differential equation

$$f'' + 2f' - 3f = \begin{cases} 0, & 0 \le t < 1\\ 1, & 1 \le t < 2\\ 0, & t \ge 2 \end{cases}$$
(2)

subject to the initial conditions f(0) = f'(0) = 0.

3. (3) Use Laplace transform methods to solve the differential equation

$$f'' + 2f' - 3f = \delta(t - 1) \tag{3}$$

subject to the initial conditions f(0) = 0, f'(0) = 1. Remember the Lapalce transform of the delta function gives $\mathcal{L}[\delta(t-a)] = e^{-as}$.

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