2E2 Tutorial Sheet 4 First Term[1]

31 Ocotber 2003

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

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

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

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

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

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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