2E2 Tutorial Sheet 2 First Term[1]

17 October 2003

1. (2) Using the Laplace transform solve the differential equation

$$f'' - 4f' + 3f = 1 \tag{1}$$

with boundary conditions $f(0) = f'(0) = 0$.

2. (2) Using the Laplace transform solve the differential equation

$$f'' - 4f' + 3f = 2e^t \tag{2}$$

with boundary conditions $f(0) = f'(0) = 0$. In this example there is a repeated factor in the fraction, so remember that the partial fraction expansion looks like:

$$\frac{1}{(s-a)^2(s-b)} = \frac{A}{s-a} + \frac{B}{(s-a)^2} + \frac{C}{s-b} \tag{3}$$

3. (2) Using the Laplace transform solve the differential equation

$$f'' - 4f' + 3f = 0 \tag{4}$$

with boundary conditions $f(0) = 1$ and $f'(0) = 1$.

4. (2) Using the Laplace transform solve the differential equation

$$y'' - 2ay' + a^2 y = 0 \tag{5}$$

with boundary conditions $y'(0) = 1$ and $y(0) = 0$. a is some real constant. In this question it might be helpful to work out the Laplace transform of te^{at}.

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