26 Febuary 2006

Useful fact:

- To solve Euler's equation use the substitution

$$x = \exp z$$

Questions

1. Obtain the general solutions of the ODEs

    (a) $y'' + y' + 3y = 0$

    (b) $y'' + y = f(x)$, where f is the periodic square wave defined by

    $$f(x) = \begin{cases} 1, & 0 < x < \pi \\ -1, & -\pi < x < 0 \end{cases} \quad \text{and } f(x + 2\pi) = f(x)$$

    (c) $y'' + y' + 3y = e^{-|x|}$.

2. Solve the Euler type equations

    (a) $x^2 y'' + 4xy' + y = 0$.

    (b) $x^2 y'' + 3xy' + y = 0$.