231 Tutorial Sheet 16.[1,2]

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

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

[1]Conor Houghton, houghton@maths.tcd.ie, see also http://www.maths.tcd.ie/~houghton/231
[2]Including material from Chris Ford, to whom many thanks.