Course 2BA1: Trinity Term 2004.

Assignment IV.

To be handed in by Wednesday 28th April, 2004.
Please include both name and student number on any work handed in.

1. Find the general solution of the differential equation

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = x\,e^{-3x}.$$

   Find also the solution satisfying $y(0) = y'(0) = 0$.

2. Let $f\colon \mathbb{R} \to \mathbb{R}$ be the function with period 1 defined such that

   $f(x) = (x-m)(m+1-x)$ when $m \le x \le m+1$ for some integer m.

   Express the function f as a Fourier series of the form

$$f(x) = \frac{1}{2}a_0 + \sum_{n=1}^{\infty} a_n \cos 2\pi n x.$$