# Course 2BA1: Trinity Term 2005.
# Assignment IV.

**To be handed in by Wednesday 4th May, 2005.**
**Please include both name and student number on any work handed in.**

1. Find the general solution of the differential equation

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = 9x\cos 3x - 24\sin 3x.$$

2. Let $f: \mathbb{R} \to \mathbb{R}$ be the function with period 4 whose values on the interval $[0, 4]$ are defined as follows:

$$f(x) = \begin{cases} 2x & \text{if } 0 \le x \le 2; \\ 8 - 2x & \text{if } 2 \le x \le 4. \end{cases}$$

Express the function $f$ as a Fourier series of the form

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