# Course 2BA1: Trinity Term 2003.
# Assignment V.

**To be handed in by Wednesday 30th April, 2003.**
**Please include both name and student number on any work handed in.**

1. Find the general solution of the differential equation

$$\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 58y = x \sin 2x.$$

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

2. Let $f \colon \mathbb{R} \to \mathbb{R}$ such that

$$f(x) = 4(x - m) \text{ if } m \le x \le m + \tfrac{1}{2} \text{ for some integer } m;$$

$$f(x) = 4(m + 1 - x) \text{ if } m + \tfrac{1}{2} \le x \le m + 1 \text{ for some integer } m.$$

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

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