Course 2BA1: Trinity Term 2002.
Assignment VI.

To be handed in by Wednesday 1st May, 2002.
Please include both name and student number on any work handed in.

1. Find the general solution of the differential equation

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 37y = x^2 e^x.$$

   Find also the particular solution satisfying the initial conditions $y(0) = 0$ and $y'(0) = 5$.

2. Calculate the Fourier series of the function $f \colon \mathbb{R} \to \mathbb{R}$ which is periodic, with period 2π, and which is defined on the interval $-\pi \leq x \leq \pi$ by the following formulae:

$$f(x) = \begin{cases} 2 + \dfrac{2x}{\pi} & \text{if } -\pi \leq x \leq -\frac{1}{2}\pi; \\ 1 & \text{if } -\frac{1}{2}\pi \leq x \leq \frac{1}{2}\pi; \\ 2 - \dfrac{2x}{\pi} & \text{if } \frac{1}{2}\pi \leq x \leq \pi. \end{cases}$$