Actuarial Science 2008/09

Calculus: Coursework 2
Due in by 4:00pm, Thursday 12 December 2008
to the Mathematics Office

(Remember, it can be handed in earlier!)

1. Find the general solutions to the following inhomogeneous equations. In each case find the particular integrals using the method of variation of parameters.

   (a) $\dfrac{d^2y}{dx^2} + y = x$

   (b) $\dfrac{d^2y}{dx^2} + 5\dfrac{dy}{dx} + 4y = e^x$

   (c) $x^2\dfrac{d^2y}{dx^2} - 4x\dfrac{dy}{dx} + 6y = x^2$

   Note: You should be able to solve these using past knowledge (good for checking). However, if you don't use variation of parameters you won't get the marks.

2. Find the general solution to the following using variation of parameters

$$\frac{d^2y}{dx^2} + y = \sec x$$

3. Find the general solution to

$$(1 - x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0.$$