MATH2132 Test 3 **November 21, 2013** **70 minutes**

Student Name - **Student Number -**

Values

10 **1.** (a) Find an explicitly defined, one-parameter family of solutions for the differential equation

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

Simplify your solution as much as possible.

(b) Show that your family has a singular solution. Can this solution be added to the family so that it is no longer singular?

10 **2.** Find a general solution of the differential equation

$$x\frac{dy}{dx} = 2y + x^4e^{-x}.$$

13 **3.** Find a general solution for the differential equation

$$3y''' + 2y'' + 2y' - y = 2e^x - x.$$

7 **4.** (a) You are given that a general solution of the homogeneous equation associated with the linear, constant coefficient differential equation

$$\phi(D)y = x^2 + e^x\cos 2x$$

is

$$y_h(x) = C_1 + C_2x + C_3\cos 2x + C_4\sin 2x.$$

What is the differential equation?

(b) What is the form for a particular solution of the differential equation as predicted by the method of undetermined coefficients? Do **NOT** evaluate the coefficients.