MID-SEMESTER EXAMINATION
DIFFERENTIAL EQUATIONS, B. MATH III YEAR
I SEMESTER, 2011-2012

Max. you can score: 100   Time limit: 3 hrs.

1. Solve $y' = x \csc y, y(0) = \pi/2$ and specify the maximal interval of the type $(-a, a)$ on which your solution is valid.   [10]

2. Solve $y''' - 4y'' - 15y' + 18y = 1$ with the initial conditions $y(0) = 0, y'(0) = 0$ and $y''(0) = 0$.   [20]

3. Solve $(1 + xy - y^3)dx + (x^2 - xy^2 - 2y)dy = 0$ given that there is an integrating factor which is a function of xy.   [30]

4. Find a differential equation of the type $a(x)y'' + b(x)y' + c(x)y = 0$ which has x and $1/x$ as solutions on $(0, \infty)$, and solve the equation $a(x)y'' + b(x)y' + c(x)y = x^3$.   [20]

5. Solve $y'' + x^2 y' - xy = 0$ by guessing one solution and then using the Wronskian to find another linearly independent solution.   [20]

1