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FACULTY OF ART & SCIENCES, A.U.B.

Prof. N. H

Mathematics 202
(1st semester, 1994-1995)

February, 1995

Time: 2 hours

(Closed book)

1. Find the most general $M(x, y)$ so that :
 $M(x, y)dx + (\sin x \cos y - xye^{-y})dy = 0$ is exact.
2. Solve the D.E.
 $(y - e^y \sec^2 x)dx + (x - e^y \tan x)dy = 0.$
3. Solve the IVP
 $y' + 3x^{-1}y = x^2y^2; \quad y(1) = 2.$
4. Given $y^1(x) = (x-1)$ is a solution for
 $xy'' + (1-x)y' + y = 0, \quad x > 0,$
obtain a representation for the second solution.
5. Find the general solution
 $x^2y'' + 2xy' - 2y = 6x^{-2} + 3x.$
6. Apply the method for Frobenius to solve
 $x(1-x)y'' - 3y' + 2y = 0.$
7. Use the substitution $y = x^{-1/2} u(x)$ to solve
 $y'' + k^2x^2y = 0$
8. Solve the IVP
 $y' + y - \int_0^1 y(v) \sin(t-v)dv = -\sin t; \quad y(0) = 1$
9. Solve the IVP
 $y'' + y = \delta(t - 2\pi) - \delta(t - \pi); \quad y(0) = 0, \quad y'(0) = 1.$
10. Solve : $y'''' - 12y''' + 27y'' + 40y = 0.$