

PDES II, Math 8142 (old 562)

Prof. Gutiérrez Homework 1, First order pdes (Due on 2/05/09)

1. Solve the following Cauchy problems:

1. $u_x + (x + y)u_y = 1, u(x, -x) = 0;$

2. $(1 + x^2)u_x + 2xyu_y = 0, u(x, x + x^3) = h(x);$

3. $(y + 1)u_x + (x + 1)u_y = u^2$ passing through the curve $(s, -s, 1/\log s), s > 0;$

4. $x^2u_x - y^2u_y + 2(x - y)u = 0, u(x, x) = x;$

5. $u_x = (u_y)^2, u(0, y) = y^2/2;$

6. $xu_x + yu_y + u_xu_y = u, u(s, 0) = s^2;$

7. $x(u_x)^2 + yu_y = 0, u(s, 1) = -s;$

8. $x(u_x)^2 + (u_y)^3 = 1, u(s, 0) = \sqrt{s}, s > 0.$