

MA533 Partial Differential Equations

Fall 2011

Problem Set 8

December 8, 2011

DUE: Wednesday, 14 December 2011

- (1) Solve the following two initial value problems:

(a) $u_x + u_y = u^2$, with $u(x, 0) = h(x)$.

(b) $u_y = xu u_x$, with $u(x, 0) = x$.

Assume h is smooth. Both problems are posed in \mathbb{R}^2 .

- (2) Show that the solution to the quasi-linear PDE:

$$u_y + a(u)u_x = 0,$$

with initial condition $u(x, 0) = h(x)$ is given implicitly by:

$$u(x, y) = h(x - a(u)y).$$