

**Math 2900 – Spring 2008**  
**Homework II**  
**Due Jan 25**

*Problem 1:* For the equation

$$u_x^2 + u_y^2 = u^2$$

find the integral surface passing through

- a) the curve  $x = \cos s, y = \sin s, z = 1$
- b) the line  $x = s, y = 0, z = 1$

*Problem 2:* For the equation

$$u = xu_x + yu_y + \frac{1}{2}(u_x^2 + u_y^2)$$

Find a solution with  $u(x,0) = \frac{1}{2}(1 - x^2)$ .

*Problem 3:* Find by power series expansion with respect to  $y$  the solution of the initial value problem

$$u_{yy} = u_{xx} + u, \quad u(x,0) = e^x, \quad u_y(x,0) = 0$$