

**HOMEWORK 1**  
**DIFFERENTIAL EQUATIONS**  
**DUE 2012-08-22**

**Show your work!**

- (1) (a) Find the solution of  $y' = x$  such that  $y = 1$  when  $x = 1$ .  
(b) Find the solution of  $y' = y$  such that  $y = 1$  when  $x = 1$ .
- (2) The differential equation  $y' = y - x$  has a solution of the form  $y = mx + b$ . What is that solution? (You *need not* find the general solution.)
- (3) Suppose that  $x^2 + y^2 = r^2$ . Use implicit differentiation to show that  $y' = -x/y$ .
- (4) A solution to the differential equation  $y' = y - x$  passes through the point  $(x, y) = (2, 1)$ . What is its slope at that point? (You *need not* solve the equation.)