

**Math 675**  
Assignment #1  
Due September 14, 2009

Name \_\_\_\_\_

1. Solve  $y' = e^{x-y}$ .
2. Solve  $y' + xy = x$ .
3. Solve

- (a)  $y'' - 6y - 9 = 0$ ,
- (b)  $y'' + y' + 2y = 0$ ,
- (c)  $y'' - 7y' + 5y = 0$ .

4. Solve
- (a)  $x^2y'' - 6xy' - 9y = 0$ ,
  - (b)  $x^2y'' - 5xy' - 9y = 0$ .

5. Construct an exact equation of second order by differentiating the linear equation

$$y' + p(x)y = q(x)$$

in  $x$ . Use this to solve

$$y'' + (\tan x)y' + (\sec^2 x)y = 0.$$

6. Construct an exact equation of second order by differentiating the separable equation

$$f(y)y' = g(x)$$

in  $x$ . Use this to solve

$$yy'' + (y')^2 = 1.$$

7. Solve  $y'' - 3y' + 2y = x$  by variation of parameters.
8. Find the Green's function for

$$\begin{aligned} y'' - y &= f & 0 < x < 1 \\ y(0) &= y(1) = 0 \end{aligned}$$

9. Solve  $2x^2y' = (x-1)(y^2 - x^2) + 2xy$ .
10. Solve  $x^2y' + 2xy - y^2 = A$  for any  $A$ .
11. Solve  $yy'' = 2(y')^2$ .