

## Math 115 HW #11

Due Friday, December 11

1. Show that the power series solution of the differential equation

$$y' - py = 0$$

is equivalent to the solution found using some other technique.

2. Use power series to solve the differential equation

$$y'' - xy' - y = 0$$

and find the interval of convergence of the series.

3. Find the first three terms of each of the power series representing independent solutions of the differential equation

$$y'' + x^2y = 0.$$

4. Use Taylor's theorem to solve the initial-value problem

$$y'' - 2xy = 0, \quad y(0) = 1, \quad y'(0) = -3.$$

Use 6 terms of the series to approximate  $y$  at  $x = 1/4$ .

5. Solve the initial-value problem

$$y'' - 2xy' + 8y = 0, \quad y(0) = 1, \quad y'(0) = 0$$

6. Solve the initial-value problem

$$y'' - 2xy' + 8y = 0, \quad y(0) = 0, \quad y'(0) = 1$$

(Notice that the differential equation is the same as in #5 above—only the initial conditions are different. This differential equation is known as *Hermite's Equation* of order 4.)