



## NOTE #11: SECTIONS 5.2-5.3

**Problem 1.** Determine a lower bound for the radius of convergence of series solutions about each given point  $x_0$  for the given differential equation.

(a)  $y'' + 4y' + 6xy = 0$ ;  $x_0 = 0$ ,  $x_0 = 4$

(b)  $(4 - x^2)y'' + 4y' + 6xy = 0$ ;  $x_0 = 0$ ,  $x_0 = 4$

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$$(c) (x^2 - 2x - 3)y'' + xy' + 4y = 0; \quad x_0 = 4, \quad x_0 = 0$$

$$(d) (1 + x^3)y'' + 4xy' + y = 0; \quad x_0 = 0, \quad x_0 = 2$$

**Problem 2.** Find the power series solution of the given differential equation about 0. Find the first three nonzero terms in each of two solutions  $y_1$  and  $y_2$  (unless the series terminates sooner). If possible, find the general term in each solution.

$$(3 - x^2) y'' - 3xy' - y = 0$$

**Problem 3.** Find the power series solution of the given differential equation about 0. Find the first three nonzero terms in each of two solutions  $y_1$  and  $y_2$  (unless the series terminates sooner). If possible, find the general term in each solution.

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

**Problem 4.** Find the power series solution of the given differential equation about the point  $x_0 = 2$ . Find the first three nonzero terms in each of two solutions  $y_1$  and  $y_2$  (unless the series terminates sooner). If possible, find the general term in each solution.

$$2y'' + (x + 1)y' + 3y = 0$$