MATH 342-010 Differential Equations with Linear Algebra II
Prof. D. A. Edwards Due: Oct. 17, 2007

Homework Set 5

Read Edwards and Penney, section 8.2.

Section E8.2

1. page 519, number 11. You do not need to find an explicit expression for the general term.
2. page 520, number 31
3. page 520, number 33(a)
4. page 520, number 33(b)
5. Find the first three nonzero terms in the series for the two independent solutions of
$$y'' - xy = 0$$
near $x = -1$.
6. Write the recurrence relation for the terms in the solution of
$$xy'' + y' + xy = 0$$
near $x = 1$. What is the radius of convergence of the series?
7. *Chebyshev's equation* is given by
$$(1 - x^2)y'' - xy' + \alpha^2 y = 0. \tag{5.1}$$
(a) Determine the recursion relation for the terms in the solution to (5.1).
(b) What is the series' radius of convergence?
(c) Show that if $\alpha = n$, one of the solutions is a polynomial. What is its degree?
8. Find the first three nonzero terms in each of the two linearly independent solutions of
$$y'' + (\cos x)y' - y = 0.$$
9. Find the first five nonzero terms in the solution of
$$y'' - xy' - y = 0, \qquad y(0) = 2, \quad y'(0) = 1.$$
10. Find the first five nonzero terms in the solution of
$$(1 - x)y'' + xy' - y = 0, \qquad y(0) = -3, \quad y'(0) = 2.$$

Copyright ©2007 D. A. Edwards All Rights Reserved