

Hwmk 13

Math 528 Summer Session 1

Due 6/11 (Friday at 11:59 pm)

1 Convergence

Do the following:

- (a) 1 point pg 174 problem 2
- (b) 2 points Using equation (4) on page 176, show that the radius of convergence for the Legendre polynomials is $|x| < 1$
- (c) 1 point Looking at the differential equation for Legendre polynomials in standard form:

$$y'' - \frac{2x}{1-x^2}y' + \frac{n(n+1)}{1-x^2}y = 0$$

notice that there are singularities for our variable coefficients $\frac{2x}{1-x^2}$ and $\frac{n(n+1)}{1-x^2}$. At what values of x are these singularities?

2 Airy's Equation

- (a) 3 points Using a power series ansatz centered at $x = 0$, find the recurrence relationship for a general coefficient a_m for the equation:

$$y'' - xy = 0$$

- (b) 3 points Calculate the series up to $\mathcal{O}(t^7)$ in terms of two basis solutions.