

Third Exam

Friday, July 14, 2017

This exam is closed book, but you may use calculators. Make sure your name is on all pages. Show all work, and show it in a logical and organized manner. Each entire problem is worth 33 points, and 1 point is free. Keep this exam sheet.

1. Determine the radius of convergence of the series

$$\sum_{n=0}^{\infty} \frac{2^n}{n} x^n.$$

2. Write down the terms up to and including degree 4, of the Taylor series for

$$f(x) = \begin{cases} \frac{e^{2x} - 1}{x} & x \neq 0, \\ 2 & x = 0. \end{cases}$$

centered on $x_0 = 0$.

Hint: If you know the terms for the Mclaurin series for e^x , it is relatively easy to derive the terms for the series for f , without actually taking derivatives of f .

3. Write down the terms, up to and including degree 4, for the series solution to

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