

In class assignment 8 - Power Series

Name: _____

November 10, 2014

Directions: Work in groups to complete the following problems.

1. Find the radius of convergence for the following series:

(a) $\sum_{n=0}^{\infty} n^3 x^n$

(b) $\sum_{n=0}^{\infty} \frac{(n+1)x^n}{2^n + n}$

(c) $\sum_{n=0}^{\infty} \frac{2^n(x-1)^n}{n}$

(d) $x + 4x^2 + 9x^3 + 16x^4 \dots$

(e) $1 + 2x + \frac{4x^2}{2!} + \frac{8x^3}{3!} + \frac{16x^4}{4!} + \dots$

(f) $3x + \frac{5}{2}x^2 + \frac{7}{3}x^3 + \frac{9}{4}x^4 + \frac{11}{5}x^5 \dots$

2. Find the interval of convergence.

(a) $\sum_{n=0}^{\infty} \frac{x^n}{3^n}$

(b) $\sum_{n=0}^{\infty} \frac{n^2 x^{2n}}{2^{2n}}$

(c) $\sum_{n=0}^{\infty} \frac{(x-3)^n}{n}$

(d) $\sum_{n=0}^{\infty} \frac{(-1)^n(x-5)^n}{2^n n^2}$

3. Find a power series representation for the following functions and determine its interval of convergence.

(a) $\frac{x}{5-x}$

(b) $\frac{x^5}{7-9x^3}$

(c) $\frac{1}{(x-3)^2}$

(d) $\int \frac{t}{1+t^3} dt$

4. Find a power series representation for $\arctan(x)$. Determine the interval of convergence and use it to represent $\frac{\pi}{4}$ as an infinite series.