Math 112
Problem Set #9

ATUL ANURAG
email: aa2894@njit.edu

Problem 1: Find the Taylor series for e^{-x^2} centered at 0. What is the interval of convergence for this series?

Problem 2: Determine if the following series converges or diverges.

$$\sum_{n=3}^{\infty} \frac{e^{-n}}{n^2+2n}$$

Problem 3: Determine whether the following series converge or diverge

$$\sum_{n=1}^{\infty} \frac{n!}{n^n}$$

Problem 4: Determine whether the following series converge or diverge

$$\sum_{n=1}^{\infty} \frac{n+4^n}{n+6^n}$$

Problem 5: For each of the following power series, find the interval of convergence and the radius of convergence:

$a. \sum_{n=1}^{\infty}(-1)^n n^2 x^n$

$b. \sum_{n=1}^{\infty} \frac{2^n}{n^2}(x-3)^n$

$c. \sum_{n=1}^{\infty}(-1)^n \frac{10^n}{n!}(x-10)^n$

Problem 6: Consider the function $g(x)$ defined by the power series:

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

a. Find the radius of convergence of the power series.

b. Use the first 3 non-zero terms of the power series to estimate

$$\int_0^1 \frac{g(x)-1}{x}\,\mathrm{d}x$$

Problem 7: Determine whether the following series converge or diverge.

$$\sum_{n=1}^{\infty} \frac{1}{n^{1+1/n}}$$

Problem 8: Find the Maclaurin series for $f(x) = \frac{1}{1+2x^2}$. What is the interval of convergence for this series?