PILOT LEARNING
CALCULUS II ENGINEERING
PROBLEM-SET 12
FALL 2019

(1) Find the radius of convergence and the interval of convergence of the following series

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

(b) $\sum_{n=1}^{\infty} \frac{x^n}{n3^n}$

(c) $\sum_{n=100}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}$

(d) $\sum_{n=1}^{\infty} n^n x^n$

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

(f) $\sum_{n=1}^{\infty} \frac{n^2 x^n}{2^n}$

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

(h) $\sum_{n=2}^{\infty} \frac{x^{2n}}{n(\ln n)^2}$

(2) Find a power series representation for the function and determine the interval of convergence.

(a) $f(x) = \frac{x^2}{a^3 - x^3}$

(b) $f(x) = \frac{x}{9 + x^2}$

(c) $f(x) = \frac{1+x}{1-x}$

(d) $f(x) = (1-x)^{-2}$

(e) $f(x) = 2^x$

(3) Find the Taylor series for f(x) centered at the given value of a. Also, find the associated radius of convergence.

(a) $f(x) = x^4 - 3x^2 + 1; \quad a = 1$

(b) $f(x) = \cos x; \quad a = \pi$