PILOT LEARNING
CALCULUS II ENGINEERING
PROBLEM-SET 10
FALL 2019

(1) Determine whether the series is convergent or divergent

(a) $\sum_{n=1}^{\infty} \frac{1}{n^2+4}$

(b) $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

(c) $\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$

(d) $\sum_{n=3}^{\infty} \frac{n^2}{e^n}$

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

(f) $\sum_{n=1}^{\infty} \sin(1/n)$

(2) Explain why the integral test cannot be used to determine whether

$$\sum_{n=1}^{\infty} \frac{\cos \pi n}{\sqrt{n}}$$

converges.

(3) Find all positive values of b for which the series

$$\sum_{n=1}^{\infty} b^{\ln n}$$

converges.

(4) Approximate the sum of the series correct to 4 decimal places.

(a) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} n^2}{10^n}$

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

(5) Suppose $\sum_{n=1}^{\infty} a_n$ is a convergent series where each term a_n is positive. Is the series $\sum_{n=1}^{\infty} \sin(a_n)$ convergent?

(6) Show that the series $\sum_{n=1}^{\infty} (-1)^{n-1} b_n$ where $b_n = \frac{1}{n}$ when n is odd and $b_n = \frac{1}{n^2}$ when n is even, is divergent. Why does the alternating series test not apply?