

Recitation #18: Comparison Tests and Alternating Series

Problem 1 Determine if the following series absolutely converge, conditionally converge, or diverge.

(a) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n+3}$

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

(c) $\sum_{n=1}^{\infty} (-1)^{n+1} n^2 e^{-\frac{n^3}{3}}$

(d) $\sum_{n=0}^{\infty} \frac{(-1)^n \cdot 5}{3^n + 3^{-n}}$

(e) $\sum_{n=4}^{\infty} \frac{(-2)^n}{n}$

(f) $\sum_{n=0}^{\infty} \frac{n^2 + 2n + 1}{3n^4 + 1}$

(g) $\sum_{n=1}^{\infty} \left[\left(1 + \frac{1}{n} \right)^2 e^{-n} \right]$

Problem 2 (a) Find an upper bound for how close $\sum_{k=0}^4 \frac{(-1)^k k}{4^k}$ is to the value

of $\sum_{k=0}^{\infty} \frac{(-1)^k k}{4^k}$.

(b) (Calculator Recommended) How many terms are needed to estimate $\sum_{n=1}^{\infty} \frac{(-1)^n \ln n}{n!}$ to within 10^{-6} ?