

Homework Problems for Chapter 11, Section 6

(1) Determine whether $\sum_{n=5}^{\infty} \frac{n!(2n)!5^n}{(3n)!}$ converges or diverges.

(2) Determine whether $\sum_{n=1}^{\infty} \frac{(-1)^n n^n}{n!3^n}$ converges or diverges.

(3) Determine whether $\sum_{n=1}^{\infty} \frac{\cos(n^4 + 2)}{n^{5/4}}$ converges or diverges.

(4) Determine whether $\sum_{n=1}^{\infty} \frac{n!2^n}{n^n}$ converges or diverges.

(5) Determine whether $\sum_{n=1}^{\infty} \frac{(n^3 + n + 8) \sin(e^n)}{2^n}$ converges or diverges.

(6) Determine whether $\sum_{n=1}^{\infty} \frac{2^n + n}{3^n - 1}$ converges or diverges.

(7) Determine whether $\sum_{n=1}^{\infty} \left(\frac{2n^2 + n + 15}{3n^2 - n - 1} \right)^n$ converges or diverges.

(8) Assume that the numbers a_n are defined recursively by $a_1 = 27$, $a_{n+1} = -\frac{3n+1}{4n+3}a_n$ for $n = 1, 2, 3, \dots$. Determine whether $\sum_{n=1}^{\infty} a_n$ converges or diverges.