10.5 The Ratio Test

Let $\{a_n\}$ be a sequence and assume that the following limit exists: $\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = L$

$i)$ If $L < 1$, then the series $\sum_{n=1}^{\infty} a_n$ is ________________.

$ii)$ If $L > 1$ or if the limit is infinite, then the series $\sum_{n=1}^{\infty} a_n$ is ___________.

$iii)$ If $L = 1$, ________________.
(the series could be absolutely convergent, conditionally convergent, or divergent)

10.5 The Root Test

Let $\{a_n\}$ be a sequence and assume that the following limit exists: $\lim_{n\to\infty}\sqrt[n]{|a_n|} = L$

$i)$ If $L < 1$, then the series $\sum_{n=1}^{\infty} a_n$ is ________________.

$ii)$ If $L > 1$ or if the limit is infinite, then the series $\sum_{n=1}^{\infty} a_n$ is ___________.

$iii)$ If $L = 1$, ________________.
(the series could be absolutely convergent, conditionally convergent, or divergent)

Determine whether the series is convergent or divergent.

$i)\ \sum_{n=1}^{\infty} \frac{n^3}{4^n}$

Determine whether the series is convergent or divergent.

$ii)\ \sum_{n=1}^{\infty} \frac{n!}{4^n}$

Determine whether the series is convergent or divergent.

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

Determine whether the series is convergent or divergent.

$$iv)\ \sum_{n=1}^{\infty} \frac{n^2}{(2n+1)!}$$