

11.5.24
11.6.46

Quiz #3 | 6:00-7:00

1) Determining convergence or divergence of

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

Solution

The series converges by the root test:

$$\lim_{n \rightarrow \infty} \sqrt[n]{|a_n|} = \lim_{n \rightarrow \infty} \frac{n^{1/n}}{(\ln n)^{1/2}} = 0 < 1$$

$$\left(\lim_{n \rightarrow \infty} n^{1/n} = 1 \right)$$

2) Estimate the magnitude of the error involved in using the sum of the first four terms to approximate the sum of the entire series.

$$\sum_{n=1}^{\infty} \underbrace{(-1)^{n+1} \frac{1}{10^n}}_{u_n}$$

Solution

$$S_4 = \frac{1}{10} - \frac{1}{100} + \frac{1}{1000} - \frac{1}{10000} \quad |L - S_4| = |\text{error}|$$

$$|\text{error}| \leq |u_5| = \left| (-1)^6 \frac{1}{10^5} \right| = 0.00001$$