Reading Questions 6

reading: Section 9.4 : Subsection - Absolute and Conditional Convergence

1. The series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$ converges conditionally.
2. A series $\sum_{n=1}^{\infty} a_n$ converges absolutely if $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} |a_n|$ both converge.

Section 9.4 Tests for Convergence (Part 4)

Approximation

> **Theorem**
>
> Let S_n be the nth partial sum of the series $\sum_{n=1}^{\infty} (-1)^{n-1} a_n$ and let $S = \lim_{n\to\infty} S_n$. Suppose $0 < a_{n+1} < a_n$ for all n and $\lim_{n\to\infty} a_n = 0$. Then $|S - S_n| < a_{n+1}$.

P 1. Estimate the error in approximating the sum of the series $\sum_{n=1}^{\infty} (-1)^{n-1} (\frac{1}{3})^{n-1}$ by the sum of the first 4 terms. Check your answer.

P 2. Let $S = \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^2}$. Give a number k such that $|S - \frac{31}{36}| < k$.

Absolute Convergence

> **Definition**
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> The series $\sum_{n=1}^{\infty} a_n$ is absolutely convergent if both $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} |a_n|$ converge.

> **Definition**
>
> The series $\sum_{n=1}^{\infty} a_n$ is conditionally convergent if $\sum_{n=1}^{\infty} a_n$ converges but $\sum_{n=1}^{\infty} |a_n|$ diverges.

P 3. Determine if the series $\sum_{n=1}^{\infty} (-1)^{n-1} (\frac{2}{3})^n$ is absolutely or conditionally convergent.

P 4. Determine if the series $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{1}{\sqrt{n}}$ is absolutely or conditionally convergent.