MATH 153

Today

1. WeBWorK/Questions
2. 8.2 Series

Goals:

1. 8.2 Series (Understand the definition of series, the difference between a sequence and a series, and sums of some special series)

Where is today's material used?

1. Series appear frequently in chemistry and physics as a means of approximating functions.

8.2 Series

1. **Definition:** Let $\{a_n\}$ be an infinite sequence. The **infinite series** $\sum_{i=1}^{\infty} a_n$ is the sum of the members of the sequence in order: $\sum_{i=1}^{\infty} a_n = \lim_{n\to\infty} \sum_{i=1}^{n} a_n$, provided the limit exists.

2. **Definition:** The sum $s_n = \sum_{i=1}^{n} a_n$ is called the **nth partial sum** of the series. The sequence $\{s_n\}$ is called the **sequence of partial sums**.

3. **Definition:** If $\lim_{n\to\infty} s_n$ exists, the series is **convergent**; otherwise, it is **divergent**.

4. **Definition:** A geometric series is a series of the form $\sum_{i=1}^{\infty} ar^{i-1}$.

5. **Theorem:** $\sum_{i=1}^{\infty} ar^{n-1}$ is convergent if and only if $|r| < 1$, in which case the sum is $\frac{a}{1-r}$.

6. **Theorem (Test for Divergence):** If $\sum_{i=1}^{\infty} a_i$ converges, then $\lim_{n\to\infty} a_n = 0$. **The converse is FALSE!**

7. **Theorem:** If $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ are convergent series, then $\sum_{n=1}^{\infty} ca_n$ and $\sum_{n=1}^{\infty} a_n \pm b_n$ are convergent, and $\sum_{n=1}^{\infty} ca_n = c\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} a_n \pm b_n = \sum_{n=1}^{\infty} a_n \pm \sum_{n=1}^{\infty} b_n$ (where $\pm$ is read with a single sign at a time throughout).

8. Examples: 8.2, p. 443: 9, 10, 13-24, 25, 27, 35-37, 42

Next Time

1. 8.2 Series (Cont)

2. **Turn in** 8.2 WeBWorK 04: 4, 9