Calculus Section 9.2 Series and the nth Term Test for Divergence
-Understand the definition of a convergent infinite series
-Use properties of infinite geometric series
-Use the nth-Term Test for Divergence of an infinite series

Homework: page 601 #’s 5 – 14, 56

One important application of infinite sequences is in representing infinite summations. If {an} is an infinite sequence, then is an **infinite series** (or simply, a **series**). The numbers a1, a2, a3, are the **terms** of the series. Unlike sequences which always start at 1, sometimes it is convenient to begin the index at n = 0 (or some other integer).
An infinite series adds up all of the terms of the sequence while a **partial sum** only adds a certain number.
   

**Definitions of Convergent and Divergent Series**For the infinite series the **nth partial sum** is given by  . If the nth partial sum converges to S, then the series  **converges**. The limit S is called the **sum of the series**. If {Sn} diverges, then the series **diverges**.

**Example) Determine the 4th partial sum for each series.**
1) 2) 3)

$$\sum\_{n=3}^{\infty }\left(-1\right)^{n}\frac{1}{n}$$

$$\sum\_{n=1}^{\infty }1$$

$$\sum\_{n=1}^{\infty }\frac{1}{2^{n}}$$

**Properties of Infinite Series**If and c is a real number, then the following series converge to the indicated sums:

The next few sections of this chapter are concerned with determining whether a series converges or diverges. There are several tests for convergence/divergence that you will have to know. The first of which is:

**nth-Term Test for Divergence**If , then diverges. \*The converse of this ***is not*** true. If  the series ***could*** converge\*

**Example)** Determine if the Series Diverges
1)  2)  3) 