§9.1: Sequences and Infinite Series

1.] Using the explicit formulas below, write out the first four terms of each sequence:

a.) $a_n = \dfrac{n}{n+1}$, for $n = 1, 2, 3 \ldots$

b.) $b_n = \dfrac{(-1)^n(n+1)}{3^n}$, for $n = 0, 1, 2, \ldots$

2.] For each infinite sequence below: find the next two terms, determine a recurrence relation, and determine an explicit formula that describes the sequence:

a.) $\{a_n\} = \{3, 6, 12, 24, 48, \ldots\}$

b.) $\{b_n\} = \{1, 0, 1, 0, 1, \ldots\}$

3.] For each infinite sequence below, determine if the sequence converges or diverges to a limiting value, i.e., compute $\lim\limits_{n\to\infty} a_n$.

a.) $\left\{\dfrac{(-1)^n}{n^2+1}\right\}_{n=1}^{\infty}$

b.) $\{\cos(n\pi)\}_{n=1}^{\infty}$

c.) $a_{n+1} = -2a_n$ for $n = 1, 2, 3, \ldots$, where $a_1 = 1$

d.) $a_n = \dfrac{4n^3}{n^3+1}$ for $n = 1, 2, 3, \ldots$

4.] Consider the series given by

$$\sum_{k=1}^{\infty} \frac{1}{2^k}$$

a.) Find the first four partial sums S_1, S_2, S_3, and S_4 of the series.

b.) Find a formula for the n^{th} partial sum S_n of the infinite series.

c.) Make a conjecture for the value of the infinite series, and determine if it converges or diverges.

5.] Consider the series given by

$$\sum_{k=1}^{\infty} \frac{1}{k(k+1)}$$

a.) Find the first four partial sums S_1, S_2, S_3, and S_4 of the series.

b.) Find a formula for the n^{th} partial sum S_n of the infinite series.

c.) Make a conjecture for the value of the infinite series, and determine if it converges or diverges.