ESP
Kouba
Worksheet 8

1.) Compute the first five terms (starting with $n=1$) of each sequence. Determine whether each sequence converges or diverges.

a.) $\left\{ \left(\frac{1}{2}\right)^n \right\}$ b.) $\left\{ (.9999)^n \right\}$

c.) $\left\{ \frac{n}{n+1} \right\}$ d.) $\left\{ \left(1+\frac{1}{n}\right)^n \right\}$

e.) $\left\{ \left(1+\frac{2}{n}\right)^n \right\}$ f.) $\left\{ \left(2+\frac{1}{n}\right)^n \right\}$

g.) $\left\{ \left(1+\frac{1}{n}\right)^{2n} \right\}$ h.) $\left\{ \left(\frac{n}{n+1}\right)^n \right\}$

i.) $\left\{ n \cdot \cos\left(\frac{\pi}{2}+\frac{1}{n}\right) \right\}$ j.) $\left\{ \frac{n^2+n}{3n^2-n+1} \right\}$

k.) $\left\{ \frac{2^n}{n!} \right\}$ l.) $\left\{ \frac{50^n}{n!} \right\}$

m.) $\left\{ 3^{1/n} \right\}$ n.) $\left\{ n^{1/n} \right\}$

o.) $\left\{ \frac{\ln n}{n} \right\}$ p.) $\left\{ (\ln n)^{1/n} \right\}$

q.) $\left\{ \sum_{i=1}^{n} \left(\frac{1}{2}\right)^{i-1} \right\}$ r.) $\left\{ \sum_{i=1}^{n} i \right\}$

s.) $\left\{ \sum_{i=1}^{n} \left(\frac{i}{n}\right) \cdot \frac{1}{n} \right\}$ t.) $\left\{ \sum_{i=1}^{n} \frac{1}{n+i} \right\}$

2.) Determine whether the following series converge or diverge.

a.) $\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^{n-1}$ b.) $\sum_{n=1}^{\infty} (.9999)^n$

c.) $\sum_{n=1}^{\infty} 3\left(\frac{-1}{2}\right)^n$

d.) $\sum_{n=8}^{\infty} \left(\frac{1}{2}\right)^{n-1}$

e.) $\sum_{n=1}^{\infty} 4^{-n}$

f.) $\sum_{n=1}^{\infty} (-4)^n$

g.) $\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)$

h.) $\sum_{n=1}^{\infty} \left(1+\frac{1}{n}\right)^n$

i.) $\sum_{n=1}^{\infty} \frac{n}{100n+1}$

j.) $\sum_{n=1}^{\infty} \left[\frac{1}{n+1} - \frac{1}{n+2}\right]$

k.) $\sum_{n=1}^{\infty} \frac{2}{n^2+n}$

l.) $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \cdots$

m.) $1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \cdots$

n.) $3 - 2 + \frac{4}{3} - \frac{8}{9} + \frac{16}{27} - \frac{32}{81} + \cdots$

o.) $\lim_{n\to\infty} \sum_{i=1}^{n} \left(3+\frac{i}{n}\right)^2 \cdot \frac{1}{n}$

p.) $\lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{5}{1+\frac{2i}{n}}\right)\left(\frac{2}{n}\right)$

3.) A bouncing ball, which rebounds to 75% of the height from which it falls, is dropped from a height of 10 feet. What is the total distance the ball will travel?

4.) Determine the limit of the following sequence:

$$3,\ 3+\frac{1}{3},\ 3+\cfrac{1}{3+\frac{1}{3}},\ 3+\cfrac{1}{3+\cfrac{1}{3+\frac{1}{3}}},\ 3+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{3+\frac{1}{3}}}},\ \ldots$$