SERIES PROBLEMS:

1. Give a definition for what is meant by the “sum” of an infinite series.

2. Sum the following Geometric series. Be sure to include the step of writing down what $S_N$ is in each case.
   
   (a) $\sum_{n=0}^{\infty} \frac{(-1)^n}{4^n}$
   
   (b) $\sum_{n=4}^{\infty} \frac{5}{3^n}$
   
   (c) $\sum_{n=0}^{\infty} \frac{5}{2^n}$
   
   (d) $\sum_{n=0}^{\infty} \frac{2^{n+1}}{5^n}$
   
   (e) $\sum_{n=0}^{\infty} \left( \frac{1}{3^n} + \frac{(-1)^n}{5^n} \right)$

3. Use geometric series to find the rational representation of 34.2123123123....

4. A radioactive isotope is released into the air as an industrial by-product. This isotope is not very stable due to radioactive decay. Two-thirds of the original radioactive material loses its radioactivity after each month. If 10 grams of this isotope are released into the atmosphere at the end of the first and every subsequent month then
   
   (a) how much radioactive material is in the atmosphere at the end of the first two months? at the end of the twelfth month?
   
   (b) In the long run (i.e., if the situation goes on *ad infinitum*) what will be the amount of this radioactive isotope in the atmosphere at the end of each month?

5. Use **comparison test** or the **$n$-th term test** to show that the following series converge or diverge.
   
   (a) $\sum_{n=1}^{\infty} \frac{n}{3n+2}$
   
   (b) $\sum_{n=1}^{\infty} \frac{\sin^2(n)}{4^n}$
   
   (c) $\sum_{n=2}^{\infty} \frac{\ln(n)}{n}$
   
   (d) $\sum_{n=1}^{\infty} \frac{n}{n^2-1}$
   
   (e) $\sum_{n=1}^{\infty} \frac{1}{(\ln(2))^n}$