In this project we will be working on the following objectives:

- Gaining factual knowledge, terminology and methods

- Learning fundamental principles, generalizations, and theories

- Developing skill in expressing myself orally or in writing

Each group of 3 students will present one practice problem.

Group Preparation

- Solve the designated problem.

- Write up your solution (only one per group) and turn it in on the presentation day (May 6). It will count as a quality solution.

- Create and rehearse your presentation.

Group Presentation

A good presentation will (1) clearly state the problem, (2) explain your strategy for solving the problem, and (3) carefully describe the solution.

- Length: 3-5 minutes.

- Use the board. Come early to class to write up your solution.

- One member of your group will be chosen randomly to be the spokesperson.

- The presentation will count towards your grade like a quality solution.

1. Consider $\displaystyle\sum_{n=2}^{\infty} 16 \left(\frac{-3}{4}\right)^n$.

    (a) List the first five terms in the sequence of terms $\{a_n\}$.

    (b) Find the sum of the series.

2. Consider $\displaystyle\sum_{k=2}^{\infty} \ln\left(\frac{k}{k+1}\right)$.

    (a) List the first five terms in the sequence of partial sums $\{S_k\}$.

    (b) Find a closed formula for S_k.

    (c) Find the sum of the series by evaluating $\displaystyle\lim_{k\to\infty} S_k$.

3. Use a convergence test of your choice to determine whether the following series converge or diverge. Make a careful argument to justify your answers.

    (a) $\displaystyle\sum_{n=2}^{\infty} \frac{1}{\sqrt[n]{e}}$

    (b) $\displaystyle\sum_{k=2}^{\infty} \frac{2^{3k-1}}{(2k-3)!}$

    (c) $\displaystyle\sum_{k=1}^{\infty} (3k^2 + k + 1)^{-1/2}$

4. Determine whether the following series converge or diverge. In the case of convergence, state whether the convergence is conditional or absolute. Make sure that all of your conclusions are well-supported with careful arguments.

    (a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^k}{\sqrt{n(1+n)}}$

    (b) $\displaystyle\sum_{k=0}^{\infty} \frac{(-2)^k}{1+2^k}$

    (c) $\displaystyle\sum_{n=1}^{\infty} (-1)^n \, n \, e^{-n}$