Math 31 | Series Assignment #1 | §11.1 - §11.7

Due: April 23rd at 11:59 PM

Instructions

- Complete the following exercises on sperate sheets of paper. Scan your solutions and upload a PDF document. The file should have the following naming convention:

  "Last Name First Name Assignment Name.pdf"

  "Albright Charles Chapter 11 Assignment part 1.pdf"

- Make sure your pages are numbered in the lower right-hand corner.
- Make sure each page has your full name and the name of the assignment in the upper right-hand corner of each page.
- **Note:** You do not need to include this page in your solutions.

Solutions

- Because of the unique circumstances of our situation, take special care with your solutions. Make sure they are complete, organized, clear and thorough. Error on the side explaining too much.
- Your final answer should be simplified and exact.
- Graphs should be clear, legible and labeled.

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1. Use the integral test to prove $\sum_{k=1}^{\infty} \frac{1}{k(k-\sqrt{3})}$ converges.
2. Find the value of $\sum_{k=10}^{\infty} 3^{k+2} 4^{3-k}$
3. Use your knowledge of geometric series to write $10.1\overline{35}$ as a ration of two integers.
4. Why would you not want to use IT on $\sum_{k=1}^{\infty} e^{-k^2}$?
5. $\sum_{3}^{\infty} \left(\frac{1}{\ln k} - \frac{1}{\ln(k+2)} \right)$ is a telescoping series. Determine if the series converges.
6. Determine the value of $\lim_{n\to\infty} \left(\frac{1}{\ln n} - \frac{1}{\ln(n+2)} \right)$. Hint: You might be able to use #4 if the series converges.
7. A student wants to use IT on the series $\sum_{k=1}^{\infty} \left[e^{-\ln k} + \cot\left(\frac{\pi}{2}(2k+1)\right) \right]$ by defining the function f such that $f(x) = \frac{1}{x}$. Can she do that? Could she also use $f(x) = e^{-\ln x} + \cot\left(\frac{\pi}{2}(2x+1)\right)$.
8. Prove $\sum_{k=1}^{\infty} \frac{1}{k^3}$ using the integral test, series comparison test, the limit comparison test, and the ratio test. Which was the easiest to establish and implement?
9. Determine if the following series converges:

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

10. Determine if the following series converges:

$$\sum_{k=1}^{\infty} \frac{1}{4+e^{-k}}$$

11. Determine if the following series converges:

$$\sum_{k=1}^{\infty} e^{-k^2}$$

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12. Does the series

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

converge absolutely, conditionally or diverge?

This is just part 1 of two assignments.