



Instructor: Rosanna Pearlstein

Math 152 – Fall 2022  
“Week-in-Review”

1.

Determine whether the following series converges or diverges:  $\sum_{n=2}^{\infty} \frac{(-1)^n}{\ln n}$ .

2.

Determine whether the following series converges or diverges:  $\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n}}{\sqrt{n+1}}$ .



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3.

Determine whether the following series converges or diverges:  $\sum_{n=2}^{\infty} \frac{(-1)^n}{3n-1}$ .

4.

Determine whether the following series converges or diverges:  $\sum_{n=1}^{\infty} \frac{(-1)^n n}{n^3+1}$ .



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5.

Determine whether the following series converges or diverges:  $\sum_{n=1}^{\infty} \frac{\cos\left(\frac{1}{n}\right)}{n^2}$ .

6.

Determine whether the following series converges or diverges:  $\sum_{n=1}^{\infty} \frac{(-10)^n n!}{(2n+1)!}$ .



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7.

**Problem 29.** Consider the series  $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^5}$ . Use the first 5 terms to estimate the sum. Estimate the error in the approximation  $s_5$  to the sum of the series. How many terms do you need to take in order to ensure an approximation to within .01?

8.

State the Limit Comparison Test.



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9.

Determine whether  $\sum_{k=1}^{\infty} \frac{1}{k+1}$  converges or diverges.

10.

Determine whether  $\sum_{k=1}^{\infty} \frac{k + \sin k e^{-k}}{\sqrt{k^6 - k^2}}$  converges or diverges.



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11.

Determine whether  $\sum_{k=1}^{\infty} \frac{k - \cos k}{k^2 \ln(k)^2 - k}$  converges or diverges.

12.

Determine whether  $\sum_{k=1}^{\infty} \frac{k+1}{k^3-1}$  converges or diverges.



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13.

Determine whether  $\sum_{k=1}^{\infty} \sin \frac{1}{k}$  converges or diverges.

14.

**Problem 7.** What is an alternating series? What does the Alternating Series Test say? What is the remainder theorem for Alternating Series?



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15.

**Problem 8.** Determine whether  $\sum_{k=1}^{\infty} \frac{(-1)^k}{k}$  converges or diverges. If it converges, how many terms need to be taken so that the  $N$ th partial sum is within .1 of the sum?

16.

**Problem 9.** Determine whether  $\sum_{k=1}^{\infty} \frac{\cos \pi k}{\ln \ln k}$  converges or diverges. If it converges, how many terms need to be taken so that the  $N$ th partial sum is within .1 of the sum?





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17.

**Problem 10.** Determine whether  $\sum_{k=1}^{\infty} \frac{k(-1)^k}{k+1}$  converges or diverges. If it converges, how many terms need to be taken so that the  $N$ th partial sum is within .1 of the sum?

18.

**Problem 11.** Determine whether  $\sum_{k=1}^{\infty} (-1)^k \sin \frac{1}{k}$  converges or diverges. If it converges, how many terms need to be taken so that the  $N$ th partial sum is within .1 of the sum?



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19.

**Problem 12.** Determine whether  $\sum_{k=1}^{\infty} (-1)^k (\sqrt{k^2 + 1} - \sqrt{k^2})$  converges or diverges. If it converges, how many terms need to be taken so that the  $N$ th partial sum is within .1 of the sum?

20.

**Problem 13.** Determine whether  $\sum_{k=1}^{\infty} (-1)^k \frac{1}{k^2 \cos k}$  converges or diverges. If it converges, how many terms need to be taken so that the  $N$ th partial sum is within .1 of the sum?



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