

Due at the beginning of class on the day of Test 2

Direction: Solve the problems in this worksheet on separate sheets of paper. Write your solution neatly. Use standard size paper. Clearly label each problem, and include each problem in the correct order. No ragged edges. Staple multiple pages. At the top of the first page put your name, Math 2414, and the title of the worksheet. Show all work to justify your answer. Answer with insufficient work will receive no credit.

Problem 1: Find partial sums

Find the sequence of partial sums $S_1, S_2, \dots, S_6$ of the series

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

2. $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n!}$

Problem 2: Geometric series

Find the common ratio and determine whether the geometric series converges or diverges. Rewrite using summation notation. If the series converges, find the sum.

1. $8 + 6 + \frac{9}{2} + \frac{27}{8} + \dots$

3. $\sum_{n=1}^{\infty} 2(0.9)^{n-1}$

2. $\sum_{n=1}^{\infty} \frac{10^n}{(-9)^{n-1}}$

4. $\sum_{n=0}^{\infty} \frac{\pi^n}{3^{n+1}}$

Problem 3: Telescoping series

Find a formula for the **mth partial sum** of the series and use it to determine whether the series converges or diverges. If it converges, find the sum.

1. $\sum_{n=1}^{\infty} \frac{4}{n(n+2)}$

2. $\sum_{n=1}^{\infty} (e^{1/n} - e^{1/(n+1)})$

3. $\sum_{n=1}^{\infty} (\arctan(n+1) - \arctan(n))$

Problem 4: nth-term test

Explain why the given series diverges.

1. $\sum_{n=1}^{\infty} \frac{n^2 - 1}{4n^2 + 1}$

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

Problem 5: Properties of series

Find the sum of the series

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

2. $\sum_{n=1}^{\infty} \frac{1+2^n}{3^n}$

Problem 6: Make a series converge

Find all values of x for which the series converges. Then write the sum of the series as a function of x .

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

2. $\sum_{n=1}^{\infty} (-1)^n x^{2n}$