

Due at the beginning of class on the day of Test 3

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: Using the ratio test

Determine whether the series converges absolutely or diverges.

1. $\sum_{n=1}^{\infty} \frac{9^n}{n^5}$

2. $\sum_{n=1}^{\infty} \frac{(n!)^2}{(3n)!}$

3. $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} n!}{1 \cdot 3 \cdot 5 \cdots (2n+1)}$

Problem 2: Using the root test

Determine whether the series converges absolutely or diverges.

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

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

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

Problem 3: Make a series converge

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

2. $\sum_{n=0}^{\infty} n! \left(\frac{x}{2} \right)^n$

Problem 4: Recursively defined series

The terms of the series $\sum a_n$ are defined recursively as follows. Determine whether the series converges or diverges.

1. $a_1 = 2, a_{n+1} = \frac{5n+1}{4n+3} a_n$

2. $a_1 = 1, a_{n+1} = \frac{2 + \cos n}{\sqrt{n}} a_n$