

Exam #4
Math 274
December 5, 2003

Name _____

All questions are worth an equal number of points. All work is to be done on the blank paper provided. At the end of the exam, please hand in this sheet, together with all of your work.

§1 Calculation

For problems 1–5, prove that the series either converges absolutely, converges conditionally, or diverges.

1.
$$\sum_{n=1}^{\infty} \frac{n!}{1 \cdot 3 \cdot 5 \cdot 7 \dots (2n-1)}$$

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

3.
$$\sum_{n=1}^{\infty} \frac{(-1)^n (4/3)^n}{n^2}$$

4.
$$\sum_{n=1}^{\infty} \frac{(-1)^n (6n^2 - 9n + 4)}{n^3}$$

5.
$$\sum_{n=1}^{\infty} \frac{1}{2^n + 1}$$

6. Find the radius of convergence and the interval of convergence of the series
$$\sum_{n=0}^{\infty} \frac{(-2)^n x^n}{\sqrt{n+9}}$$

§2 Comprehension

7. What is the precise meaning of
$$\sum_{k=1}^{\infty} c_k?$$

8. State precisely

- a. The test for divergence.
- b. The integral test.
- c. The limit comparison test.
- d. The ratio test.

9. What is a geometric series? When is it convergent? When convergent, to what does it converge? Prove your results!

§3 Application

10. Evaluate the sum $\sum_{n=1}^{\infty} \frac{1}{n^4}$ accurately to 0.001.