Math 252 (Bueler): Quiz 9 **4 April 2024**

Name: _____ / **25**

30 minutes. No aids (book, notes, calculator, internet, etc.) are permitted. Show all work and use proper notation for full credit. Put answers in reasonably-simplified form. 25 points possible.

1. [8 points] Do the series converge absolutely, converge conditionally, or diverge? Show your work, identify tests you used, and circle one answer.

a. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

CONVERGES ABSOLUTELY CONVERGES CONDITIONALLY DIVERGES

b. $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n!}$

CONVERGES ABSOLUTELY CONVERGES CONDITIONALLY DIVERGES

2. [8 points] Use the ratio or root test to determine whether the series converges or diverges. Show your work.

a. $\displaystyle\sum_{n=0}^{\infty} \frac{n2^n}{3^n}$

b. $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^k x^k}{k!}$ where x is any real number

3. [9 points] Use any test to determine whether the series converges or diverges. Show your work.

a. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{(1+\ln n)^n}$

b. $\displaystyle\sum_{n=1}^{\infty} n^{3/2}$

c. $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \left(\sqrt{n+1} - \sqrt{n}\right)$

Extra Credit. [1 point] Consider the alternating series $S = \sum_{n=2}^{\infty} \frac{(-1)^n}{\ln(n)}$. (It is conditionally convergent.) How many terms N are needed so that the partial sum $S_N = \sum_{n=2}^{N} \frac{(-1)^n}{\ln(n)}$ is within 0.01 of the correct value S?

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