Math 252: Quiz 9 **10 November, 2022**

Name: _____ **/ 24**

30 minutes maximum. No aids (book, calculator, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form. 24 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. $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n}$

CONVERGES ABSOLUTELY CONVERGES CONDITIONALLY DIVERGES

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

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. $\displaystyle\sum_{k=0}^{\infty} \frac{k^2}{2^k}$

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

3. [8 points] Use any test to determine whether the series converges or diverges. Show your work.

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

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

EC. [1 points] (**Extra Credit**) How close is the partial sum $S_9 = \sum_{n=2}^{9} \frac{(-1)^n}{\ln(n)}$ to the conditionally-convergent series $S = \sum_{n=2}^{\infty} \frac{(-1)^n}{\ln(n)}$? State your reason, and write a specific upper bound on the remainder R_9 in the box.

$|R_9| \leq$ $\square$

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