The College of **WILLIAM & MARY**

Math 112
Lab 8

Convergent or Divergent Series

You have learned several ways to test a series for convergence or divergence. In fact, you may be thinking, you've learned too many ways! How do you decide which test should be used and is there only one correct test for each series? This lab reviews some strategies for testing series.

During lab, work in a group and discuss what test(s) can be used to determine convergence or divergence of each series below. State the reason(s) for your choice and whether absolute convergence or conditional convergence can be determined. On your own, complete the work on each series to determine convergence (absolute or conditional) or divergence. A subset of problems will be graded.

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

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

3) $\sum_{n=1}^{\infty}\left(\frac{n+1}{4n}\right)^{n}$

4) $\sum_{n=1}^{\infty}\frac{e^{n}}{n!}$

5) $\sum_{n=2}^{\infty}\frac{1}{n\ln n}$

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

7) $\sum_{n=2}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n}-1}$

8) $\sum_{n=1}^{\infty} \frac{4 \cdot 5^n - 5 \cdot 4^n}{6^n}$

9) $\displaystyle\sum_{n=1}^{\infty} \tan\left(\frac{1}{n}\right)$

10) $\displaystyle\sum_{n=1}^{\infty} \frac{\cos\left(\frac{n}{2}\right)}{n^2 + 4n}$