Math 253N ASSIGNMENT 7 **Due at the start of class Tuesday, April 25th**

Do this assignment NEATLY on additional paper.

For each of the following series

- tell what series you will compare with, and whether the comparison series converges or diverges, and why
- derive an inequality relating terms of the given series and the comparison series
- tell whether the given series converges, diverges, or whether the comparison test is inconclusive

Do all these things in exactly the manner shown in class on Friday, April 21st. Refer to the class notes if you need to.

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

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

3. $\displaystyle\sum_{n=1}^{\infty} \frac{5}{\sqrt{n}-1}$

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

5. $\displaystyle\sum_{n=1}^{\infty} \frac{3^n}{2^n-1}$

6. $\displaystyle\sum_{n=1}^{\infty} \frac{3}{n^2+n}$

Use the integral test to determine whether each of the following series converges or diverges. **Show your work as follows:**

- give the exercise number and write the given series
- calculate the appropriate integral in the proper manner for improper integrals, remembering to use x as the variable (you might wish to do this in two parts for the ones that involve a u-substitution)
- conclude by telling whether the series converges or diverges

7. $\displaystyle\sum_{n=1}^{\infty} \frac{2}{n^3}$

8. $\displaystyle\sum_{n=1}^{\infty} \frac{3}{\sqrt{n}}$

9. $\displaystyle\sum_{n=1}^{\infty} \frac{n}{n^2+1}$, let $u = x^2+1$

10. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n\ln n}$, let $u = \ln x$