

Math 104, Spring 09
Homework #6 Series

1. Write a proof that the series $\sum_{n=2}^{\infty} \frac{1}{n(\log(n))^{\alpha}}$ converge if $\alpha > 1$ and diverge for $\alpha \leq 1$ (You can use the proof on page 62 in the book).
2. Find whether the following series diverge or converge:
 - (a) $\sum_{n=1}^{\infty} \frac{n}{n^2+11}$.
 - (b) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2+9}}$.
3. Do exercises 6,7,8 page 78 in the book.
4. Let (a_n) be a sequence of real numbers. Let $\alpha = \limsup a_n$. Show that if $\beta > \alpha$ then there is an a natural number N such that $a_n < \beta$ for every $n \geq N$ (Clue: This is more or less follow from the definition on page 56 in the book).
5. Use the ratio test, root test or any other method to test for convergence

- (a) $\sum_{n=1}^{\infty} \frac{n!}{100^n}$.
- (b) $\sum_{n=0}^{\infty} \frac{\sqrt{(2n)!}}{n!}$.
- (c) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$.

Good luck!!