GEORGIA TECH

SCHOOL OF MATHEMATICS
MATH 1512

HONOR CALCULUS II

Quiz # 3

September 8th, 2004

First Name : ____

Last Name : ____

1. Is the following series converging (*Indicate the reason*) ?

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

2. For which value of $x > 0$ is the following sequence convergent (*Hint : use* $\lim_{n\to\infty}(1 + 1/n)^n = e$) ?

$$\sum_{n=2}^{\infty} \frac{x^n\, n!}{n^n}$$

3. Is the following series converging ? Is it *absolutely converging* ? Why ?

$$\frac{1}{\ln 2} - \frac{1}{\ln 3} + \frac{1}{\ln 4} + \cdots (-1)^{n-1}\frac{1}{\ln n} + \cdots$$

converging ? YES☐ NO☐

absolutely converging ? YES☐ NO☐

reasons for that :

4. Prove that if $\sum_{n=1}^{\infty} a_n^2$ and $\sum_{n=1}^{\infty} b_n^2$ converge then so does $\sum_{n=1}^{\infty} a_n b_n$ (*Hint : use an inequality*)

5. Compute the infinite product (*Hint : use* $n^2 - 1 = (n-1)(n+1)$ *and compute the partial products*)

$$\prod_{n=2}^{\infty} \left(1 - \frac{1}{n^2}\right)$$