MATH 2300-005 QUIZ 7 Name: _____

Due Tuesday, October 11th at the beginning of class. Please use additional paper as necessary to submit CLEAR and COMPLETE solutions.

1. Determine whether or not the following series converge or diverge, using what we have at our disposal thus far (comparison to a known convergent or divergent series or comparison to a convergent or divergent improper integral). Be sure to fully justify your conclusions.

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

   (b) $\displaystyle\sum_{n=2}^{\infty} \frac{1+\sqrt{n}}{\sqrt{n^4-1}}$

   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{e^n}$

   (d) $\displaystyle\sum_{n=1}^{\infty} \sin(1/n)$

   (e) $\displaystyle\sum_{n=1}^{\infty} \frac{\sin^2 n + e^{-n}}{\sqrt{n^3-n+1}}$

2. Evaluate the series $\displaystyle\sum_{n=2}^{\infty} \ln\left(1-\frac{1}{n^2}\right)$.

3. How many terms $N$ of the series $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$ can we use to guarantee the remainder

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

   is less than 0.1?