PRINT Your Name:____________________

Quiz – March 14, 2006

Explain, very thoroughly, why

$$\int_1^n \ln x \, dx < \ln n! < \int_1^{n+1} \ln x \, dx.$$ 

You might want to draw a graph and some rectangles related to the graph.

The area

$$\text{So } \sum_{i=1}^n \ln i \, \frac{1}{h} \leq \ln 2 + \ln 3 + \ldots + \ln n = \ln n!$$

The area inside the rectangles

$$\text{So } 
\ln n! = \ln 2 + \ldots + \ln n < \sum_{i=1}^{n+1} \ln i \, \frac{1}{h}$$