

## Problem 3: Limits of Sequences

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Find the limits of the following sequences. The first limit should be useful for the second one.

1. Let  $y_n = \ln(n) - \frac{1}{n} (\ln(1) + \ln(2) + \cdots + \ln(n))$ . Find  $\lim_{n \rightarrow \infty} y_n$

2.  $\lim_{n \rightarrow \infty} \left( \frac{n^n}{n!} \right)^{\frac{1}{n}}$

As always, show your work, fully explain and justify your answer. A solution mainly obtained by computers or calculators will not be accepted.

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Posting Date 9/24/2021. Submit solutions to Noah Aydin, Mathematics Department, RBH 319 by e-mail or hard-copy by 4 pm on Thursday, Oct 7, 2021. An email submission must be a single pdf file. Hard copy submissions must be dropped in the file holder at my office door (Hayes 319) and must include a time stamp.