Name: _____

Sequence and series are different but yet connected things, make sure that you understand the definition of both clearly. Don't mess them up!

Also make sure that you understand and know how to use "monotonic convergent theorem".

Warm Up Questions: Find the limit of the following sequences

1. $a_n = \dfrac{3 + 5n^2}{n + n^2}$

2. $a_n = \ln(n+1) - \ln n$

Intermediate questions:

3.   Show that if $\{a_n\}$ is convergent then $\lim_{n\to\infty} a_n = \lim_{n\to\infty} a_{n+1}$.

4.   Use the definition of limit of sequence to prove that $\lim_{n\to\infty} r^n = 0$ if $|r| < 1$.

Is the following series convergent or divergent:

5. $\displaystyle\sum_{n=1}^{\infty} \ln(1 + \frac{1}{n})$.

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

Ultimate challenges :)

7.   Let $p_{n+1} = \dfrac{2p_n}{1 + p_n}$
Find the limit of $\{p_n\}$. (Hint: condition on p_0).

8.   For what values of p does the following series converge: $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^p}$