Math 109 HW 9

Fall 2018

(Problem 1-3 are practice problems about 11.1, 11.2)

1. $\{a_n\}_{n=1}^{\infty}$ is a sequence such that $a_1 = 1$, $a_{n+1} = \frac{1}{2}(a_n + 4)$ for $n = 1, 2, 3, \cdots$. Show that the sequence is increasing and $a_n < 4$. Deduce that the sequence $\{a_n\}_{n=1}^{\infty}$ converges and find its limit.

2. Determine whether the series $\displaystyle\sum_{n=1}^{\infty} \frac{4}{3^n}$ converges or diverges. If it converges, compute its limit.

3. Determine whether the series $\displaystyle\sum_{n=1}^{\infty} \frac{n^2}{n^2 + 4}$ converges or diverges.

4. Find the values of x for which the series $\displaystyle\sum_{n=1}^{\infty} \frac{3^n}{x^n}$ converges. Find the sum of the series for those values of x. (The sum is a function of x.)

Determine whether the series converges or diverges.

5. $\displaystyle\sum_{n=1}^{\infty} \frac{n^2}{n^2 + 4}$

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

7. $\displaystyle\sum_{n=2}^{\infty} \frac{n}{n^4 - 1}$

8. $\displaystyle\sum_{n=1}^{\infty} \frac{3^{-n}}{4 + 3^{-n}}$