

Homework #13 (due Wednesday, Sept. 26)

• Read pp. 56-59.

Need to know: Definition 2.4.3, theorem 2.4.6

Do the following problems:

1. Use the definition of convergence to $+\infty$ from class to prove that $\lim_{n \rightarrow \infty} \frac{n^2-3}{n+4} = +\infty$.

2. Find $\lim_{n \rightarrow \infty} \frac{(2n+1)^{10} \cdot (3n-1)^{20}}{(n+7)^{30}}$

and use Algebraic limit theorem to justify your answer.

3. Let $a_1 = \sqrt{2}$ and $a_{n+1} = \sqrt{a_n + 2} \quad \forall n \in \mathbb{N}$.

a) Find a_2, a_3, a_4 .

b) Use induction to show that $a_n \leq 2 \quad \forall n \in \mathbb{N}$.

c) Use induction to show that (a_n) is increasing.

d) Justify that $\lim_{n \rightarrow \infty} a_n = a$ exists and find a .

4. Do # 2.4.7 (a)(b)

5. Graduate problem # 2.4.7 (c), (d)
(Extra credit for undergraduates)