

The University of Waikato
Department of Mathematics

Elements of Analysis math252-10B 2010 Assignment 2

Due Friday 6th August: Please hand back your completed assignment through the slot for this paper outside the Mathematics Office G3.19.

It should be written up neatly and on no more than four sides of an A4 page or the equivalent.

1. Show that

$$\lim_{n \rightarrow \infty} \frac{n^2}{n^2 + 2} = 1.$$

first using limit theorems and then using ϵ and N_ϵ .

2. Use the limit theorem and useful limits to evaluate

$$\lim_{n \rightarrow \infty} \left[(2n)^{\frac{1}{n}} + 5 \frac{\log n}{n} \right].$$

3. Sum the following series to 3 terms, to n terms and to infinity by finding the limit of the sequence of partial sums:

$$\sum_{n=1}^{\infty} \left(\frac{1}{4^n} + \frac{3}{n(n+1)} \right).$$

4. Test the following series for convergence or divergence:

$$(a) \quad \sum_{n=1}^{\infty} \frac{5^n}{5^n + 1},$$

$$(b) \quad \sum_{n=1}^{\infty} \frac{1}{n^2 + 2n + 3},$$

$$(c) \quad \sum_{n=1}^{\infty} \frac{4^n}{n!},$$

$$(d) \quad \sum_{n=1}^{\infty} \frac{1}{3n + 2}.$$

Kevin Broughan
28th July 2010