

DEPARTMENT OF MATHEMATICS AND STATISTICS

1. Midterm

16. 10. 2008

1. Solve

$$\lim_{n \rightarrow \infty} \frac{(n+2)(3n+4)}{(5n+6)(7n+8)}.$$

Show the working that led to your conclusion! In this task you may use the theorems of the course as well as knowledge concerning the limit values of constant sequences and the sequence $(\frac{1}{n})$.

2. Show, using the definition of the limit of a sequence, that

$$\lim_{n \rightarrow \infty} \frac{7n+1}{n+7} = 7.$$

3. Show, using the definition of the limit of a sequence, that

$$\lim_{x \rightarrow 2} \sqrt{x+1} = \sqrt{3}.$$

You may not refer to the continuity of the square root function.

4. Does a sequence converge or diverge when it is defined by the conditions $x_1 = 1$ and

$$x_{n+1} = x_n + \frac{1}{2^{(n^2)}}$$

when $n = 1, 2, 3, \dots$. Show the working that led to your conclusion!