Lecture 5

1. For the given sequences

- determine the first three terms
- determine the minimum, maximum, infimum and supremum
- decide the boundedness of the sequence
- sketch the graph of the first three terms

a) $a_n = \dfrac{-3n}{n+1}$

b) $a_n = 2n + 1$

2. Calculate the following limits:

a) $\displaystyle\lim_{n\to\infty} \frac{3n-1}{n+4}$

b) $\displaystyle\lim_{n\to\infty} \frac{2n+5}{4n+8}$

c) $\displaystyle\lim_{n\to\infty} \frac{n-2}{n^2+6}$

d) $\displaystyle\lim_{n\to\infty} \frac{n^3 - 10n^2 - 4}{5n^2 + 100}$

e) $\displaystyle\lim_{n\to\infty} \left(\sqrt{n+2} - \sqrt{n}\right)$

f) $\displaystyle\lim_{n\to\infty} \left(n - \sqrt{n^2 + 5n}\right)$

g) $\displaystyle\lim_{n\to\infty} \left(2n - \sqrt{2n^2 + 4n}\right)$

h) $\displaystyle\lim_{n\to\infty} \left(\sqrt{n}(\sqrt{n+1} - \sqrt{n})\right)$

i) $\displaystyle\lim_{n\to\infty} \frac{4^{n-1} - 5}{2^{2n} + 1}$

j) $\displaystyle \lim_{n\to\infty} \frac{2^{n+1} + 3^{n+2}}{3^{n+3}}$

k) $\displaystyle \lim_{n\to\infty} \frac{3^{2n+1} - 2^{n-1}}{5^n + 1}$

l) $\displaystyle \lim_{n\to\infty} \frac{2^{2n-1} + 3^{n+1}}{5^{n-1} - 1}$

m) $\displaystyle \lim_{n\to\infty} \left(1 + \frac{1}{n}\right)^n = e$

3. Determine whether the given geometric series is convergent and, if so, determine its sum.

a) $\displaystyle \sum_{n=1}^{\infty} \left(-\frac{1}{3}\right)^n$

b) $\displaystyle \sum_{n=1}^{\infty} \left(\frac{11}{10}\right)^n$