Exercises
Mathematics A1
Numerical sequences

1. Let $a_n = \frac{2n-1}{5n+2}$. Find the smallest positive integer N such that for every $\forall n \geq N$ the difference between a_n and the limit of $\{a_n\}$ be less than $\varepsilon = 0{,}01$.

2. Write the first 5 terms of the following sequences. Check if the sequence is bounded, monotonic, convergent. Find the limit of the sequence (if there is any).

a.) $a_n = n^2 + (-1)^n n^2$, b.) $a_n = \frac{n-1}{n+1}$, c.) $a_n = \frac{5^n}{n!}$.

3. Convergent or divergent? If converges, find its limit.

a.) $a_n = \frac{(3n-1)(n+2)}{(1-n)(2n+5)}$, b.) $a_n = \frac{4^n}{3 \cdot 4^n + 2}$, c.) $a_n = n\left(\sqrt{n^2+1} - n\right)$,

d.) $a_n = \frac{2+5+8+...+(3n-1)}{n}$, e.) $a_n = \left(\frac{n-2}{n}\right)^{3n+1}$, f.) $a_n = \left(1 + \frac{1}{\sqrt{n}}\right)^n$.

g.) $a_n = \frac{\sin(2n)}{n^3}$, h.) $a_n = \sqrt{n^2+1} - \sqrt{n^2-1}$, i.) $a_n = \frac{n - \sqrt[3]{n^2}}{n + \sqrt{n^2+1}}$

j.) $a_n = \frac{(-1)^n + 5 \cdot 4^n - 6^n}{6^{n+2}}$ k.) $a_n = \sqrt{\frac{n^3 + (-1)^n n^3}{3n^3 + n + 8}}$