

MAT 319/320: HOMEWORK 4
DUE FRIDAY, OCT 13

1. Find the binary representation of the following numbers:
 - (a) $2/3$
 - (b) 0.625
2. (a) Let $x_n = \frac{1}{4n-3}$. Find an integer K such that $x_n < \frac{1}{35}$ for all $n \geq K$. Explain your reasoning.
 - (b) Same as (a) with $x_n = \frac{1}{2^n}$.
Hint: use the calculations in 3.1.11 (b).
3. Use the definition of limit to prove that:
 - (a) $\lim_{n \rightarrow \infty} \frac{n}{2n-1} = \frac{1}{2}$
 - (b) $\lim_{n \rightarrow \infty} \frac{\sqrt{n}}{n+1} = 0$.
4. (a) Let a_n be a converging sequence such that $\lim a_n = L < 0$. Show that then there exists $K \in \mathbb{N}$ such that $a_n < 0$ for all $n \geq K$.
 - (b) Let a_n be a converging sequence such that $a_n > 0$ for all n . Show that then $\lim a_n \geq 0$. Is it true that $\lim a_n > 0$?