**Mathematics 2200H – Mathematical Reasoning**

Trent University, Fall 2015

**Assignment #9**

*Due on Monday, 23 November, 2015.*

**~~Epsolinics~~ ~~Epsilinoes~~ Epsilonics**

Recall that a *sequence* of real numbers is a list indexed by the natural numbers,

$$a_0,\ a_1,\ a_2,\ a_3, \ldots,\ a_n, \ldots$$

usually denoted by something like $\{a_n\}$. The *limit* of a sequence $\{a_n\}$ is a real number $L$, usually denoted by $\lim_{n\to\infty} a_n = L$, if

for every real number $\varepsilon > 0$, there is some $N \in \mathbb{N}$,
such that for every $n \geq N$, $|a_n - L| < \varepsilon$,

*i.e.* $\forall \varepsilon > 0 \exists N \in \mathbb{N} \forall n \in N : |a_n - L| < \varepsilon$.

**1.** Suppose $\{a_n\}$ is a sequence such that $\lim_{n\to\infty} a_n = L \neq 0$. Show that if $b_n = \dfrac{1}{a_n}$, then $\lim_{n\to\infty} b_n = \lim_{n\to\infty} \dfrac{1}{a_n} = \dfrac{1}{L}$. *[10]*