Mathematics 1110H – Calculus I: Limits, Derivatives, and Integrals
TRENT UNIVERSITY, Fall 2018

Assignment #0[‡]
Limitations and Summations
Due on Friday, 14 September.

Suppose we let $a_n = \frac{1}{3} + \frac{1}{4} + \frac{3}{16} + \frac{9}{64} + \cdots + \frac{3^{n-1}}{4^n}$ for $n = 0, 1, 2, \ldots$ That is, we have $a_0 = \frac{1}{3}$, $a_1 = \frac{1}{3} + \frac{1}{4} = \frac{7}{12}$, $a_2 = \frac{1}{3} + \frac{1}{4} + \frac{3}{16} = \frac{37}{48}$, and so on.

1. Compute $L = \lim_{n\to\infty} a_n$. *[5]*

2. How large does N have to be to guarantee that a_n is within $0.01 = \frac{1}{100}$ of L for *all* $n \geq N$? Explain why! *[5]*

Hint: Look up geometric series.

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Flappity, Floppity, Flip!
The Mouse on the Möbius Strip.
The Strip revolved,
The Mouse dissolved
In a chronodimensional skip.

17

Little Jack Horner
Sits in a corner
Extracting cube roots to infinity,
An assignment for boys
That will minimize noise
And produce a more peaceful vicinity,

From *The Space Child's Mother Goose* by Frederick Winsor.

[‡] Think of it as bonus, or perhaps as a warmup, assignment. There is less to it than meets the eye, especially if you take the hint.