Mathematics 1110H – Calculus I: Limits, Derivatives, and Integrals
TRENT UNIVERSITY, Summer 2025 (S62)

Quiz #1 – Limits
Due on Thursday, 19 June.[*]

NOTE. Please show all the steps in your solutions to both of the problems below.

1. Use the ε–δ definition of limits to verify that $\lim_{x \to -1} (2x + 4) = 2$. *[2.5]*

NOTE. You may use the standard version of the definition or the alternate game form of the definition, as you prefer.

2. Work out $\lim_{t \to 1} \dfrac{\sqrt{t} - 1}{t^2 - 1}$ using the limit laws. *[2.5]*

Hint: Algebra!

There's a Delta for Every Epsilon (Calypso)

There's a delta for every epsilon,
It's a fact that you can always count upon.
There's a delta for every epsilon
    And now and again,
    There's also an N.

But one condition I must give:
The epsilon must be positive
A lonely life all the others live,
    In no theorem
    A delta for them.

How sad, how cruel, how tragic,
How pitiful, and other adjec-
Tives that I might mention.
The matter merits our attention.
If an epsilon is a hero,
Just because it is greater than zero,
It must be mighty discouragin'
To lie to the left of the origin.

This rank discrimination is not for us,
We must fight for an enlightened calculus,
Where epsilons all, both minus and plus,
    Have deltas
    To call their own.

Words and music by Tom Lehrer. Published in American Mathematical Monthly, Vol. **81** *(1974), p. 612, and elsewhere.*

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[*] You should submit your solutions via Blackboard's Assignments module, preferably as a single pdf. If submission via Blackboard fails, please submit your work to your instructor by email or on paper. You may work together and look things up, so long as you write up your submission by yourself and give due credit to your collaborators and any sources you actually used.