1. Consider the infinite sequence \( \{a_k\}_{k=1}^{\infty} \) defined by \( a_k = (2014 + 99k^2)^{1/k^2} \).

1A. Make a table with \( k \) values 1, 5, 10, 50, 100, 500, and 1000 that helps you determine the limit \( L \) of this sequence. Write all values of \( a_k \) to at least eight places after the decimal point, in your table (warning: if you use the “Table” feature on your calculator (such as a TI-83), it rounds everything to four or five places in the table; you need to put the cursor in the column of Y values and the calculator will show the corresponding table entry to about 13 places at the bottom of the screen).

1B. Let \( \epsilon = 0.001 \) and find the smallest \( N \) such that if \( k \geq N \) then \( |a_k - L| < \epsilon \) (so \( |a_{N-1} - L| \) will not be less than \( \epsilon \)). In particular say what both \( a_N \) and \( a_{N-1} \) are to at least eight places after the decimal point.

1C: Show how the natural log function (ln) and l’Hopital’s rule are used to also give the same value of \( L \). Show all the steps!

1D: Is \( \{a_k\}_{k=1}^{\infty} \) bounded above? Explain why/why not.