6. [6 points] Let \( L(x) \) be the linear approximation and \( Q(x) \) be the quadratic approximation to the function \( d(x) \) near \( x = 1 \). Suppose that \( d'(x) \), \( d''(x) \) and \( d'''(x) \) are defined for all real numbers. Let \( Q(x) = 7(x - 1)^2 - 8(x - 1) + 3 \). Find the exact value of the following quantities. If there is not enough information to answer the question, write “NI”.

\[
\begin{align*}
  d(0) &= \text{NI} & d'(1) &= -8 & d''(1) &= 14 \\
  L'(2) &= -8 & Q'''(1) &= 0 & d'''(1) &= \text{NI}
\end{align*}
\]

Solution:

7. [5 points] Sketch graphs of functions \( f(x) \) and \( g(x) \) satisfying the conditions below, or circle NO SUCH FUNCTION EXISTS. You do not need to explain your answer.

A function \( f(x) \) defined on the interval \((0, 4)\) that satisfies:

i) \( f'(x) > 0 \) for all \( x \neq 2 \).

ii) \( x = 2 \) is a global minimum.

\[ y = f(x) \]

\[ y = g(x) \]

or

NO SUCH FUNCTION EXISTS