2. [5 points] The logistic function, which is frequently used in machine learning applications, is given by the formula

\[ S(r) = \frac{1}{1 + e^{-2r}}. \]

Use the limit definition of the derivative to write an explicit expression for \( S'(3) \). Your answer should not involve the letter \( S \). Do not attempt to evaluate or simplify the limit. Please write your final answer in the answer box provided below.

Solution:

\[ S'(3) = \lim_{h \to 0} \frac{\frac{1}{1 + e^{-2(3+h)}} - \frac{1}{1 + e^{-6}}}{h}. \]